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Horvitz et al.

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(45) **Date of Patent: Sep. 13, 2016**

(54) **STATISTICAL MODELS AND METHODS TO SUPPORT THE PERSONALIZATION OF APPLICATIONS AND SERVICES VIA CONSIDERATION OF PREFERENCE ENCODINGS OF A COMMUNITY OF USERS**

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(73) Assignee: **Microsoft Technology Licensing, LLC**, Redmond, WA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/827,013**

(22) Filed: **Jun. 30, 2010**

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(51) **Int. Cl.**

G06F 17/30	(2006.01)
G06F 7/00	(2006.01)
G06Q 30/02	(2012.01)

(52) **U.S. Cl.**

CPC ***G06Q 30/02*** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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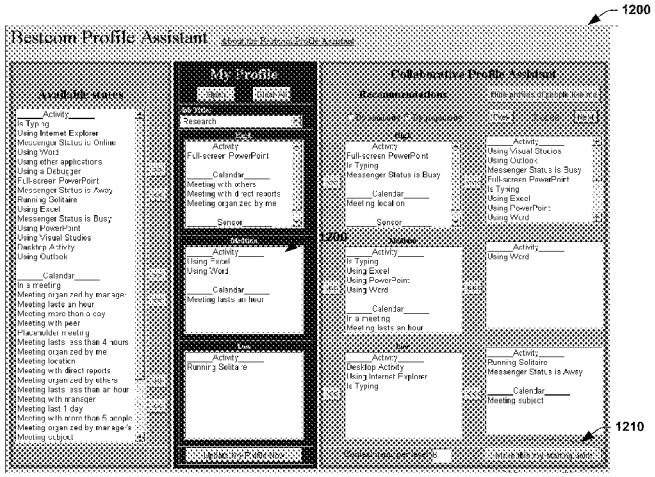
(57) **ABSTRACT**

A statistical methodology is employed for assisting people with the setting of parameters of software applications or services. With the method, information about demographics and/or about the complete or partial preferences of other people, are analyzed to infer recommendations for settings and functionality of a computer application or service. A system is reviewed with the ability to receive data regarding a plurality of users, and stores respective profiles for these users in a community store. The system can leverage off of these completed and/or partially completed profiles of parameters representing preferences about software operation in connection with building new profiles for users (new and/or existing). Data regarding a user that desires to build a new profile is employed in connection with the community profiles to facilitate the user building a personalized profile. Various statistical and/probabilistic schemes can be employed, for example, collaborative filtering techniques to identify to the user the top n settings by particular parameter(s), top m settings by popularity, top x most similar profiles to facilitate the user selecting most appropriate sub-profiles as part of a personalized profile building and selection effort.

20 Claims, 22 Drawing Sheets



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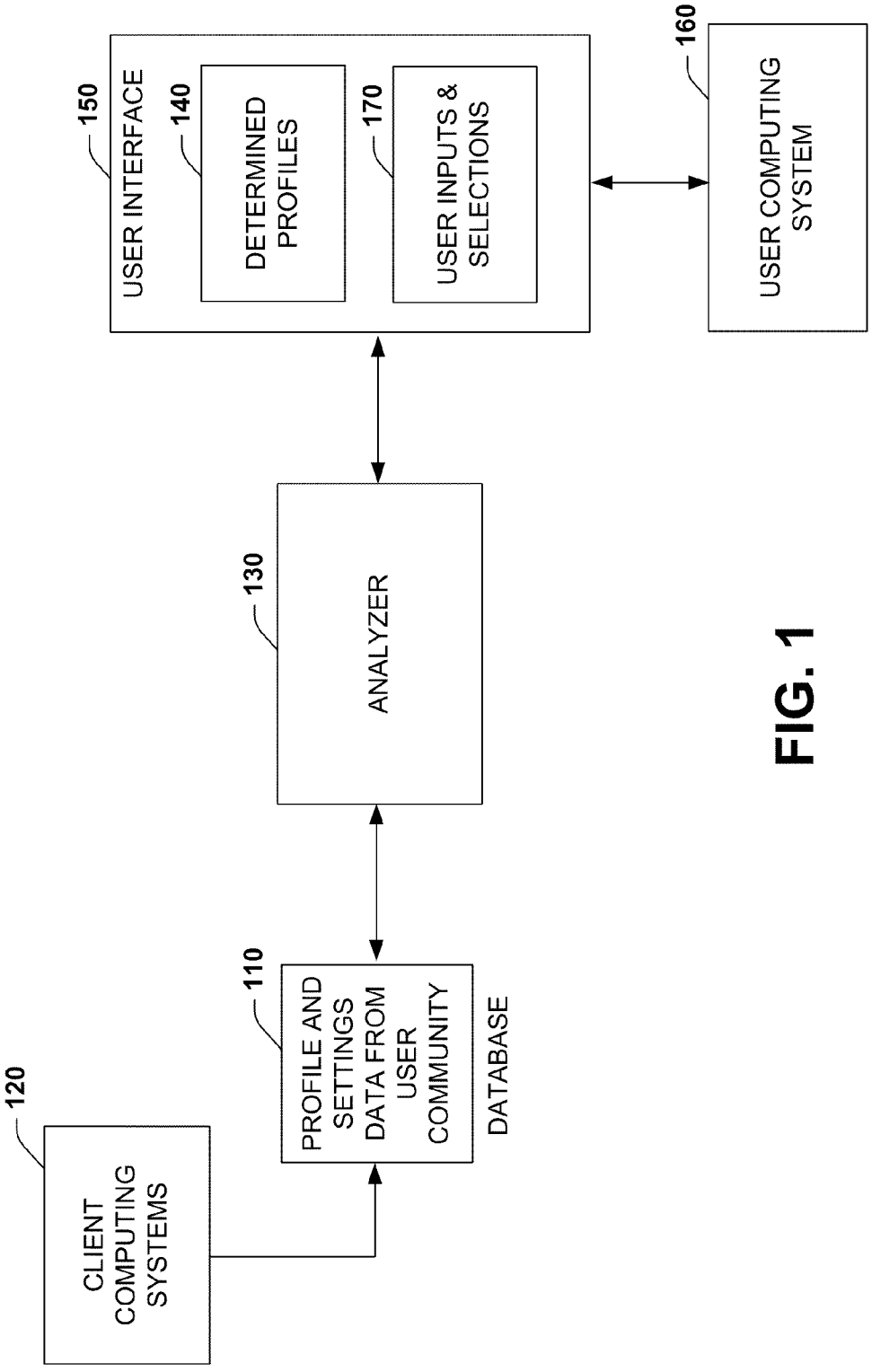
100
150
USER INTERFACE
140
DETERMINED PROFILES
170
USER INPUTS & SELECTIONS
160
USER COMPUTING SYSTEM
130
ANALYZER
110
PROFILE AND SETTINGS DATA FROM USER COMMUNITY
DATABASE
120
CLIENT COMPUTING SYSTEMS

FIG. 1

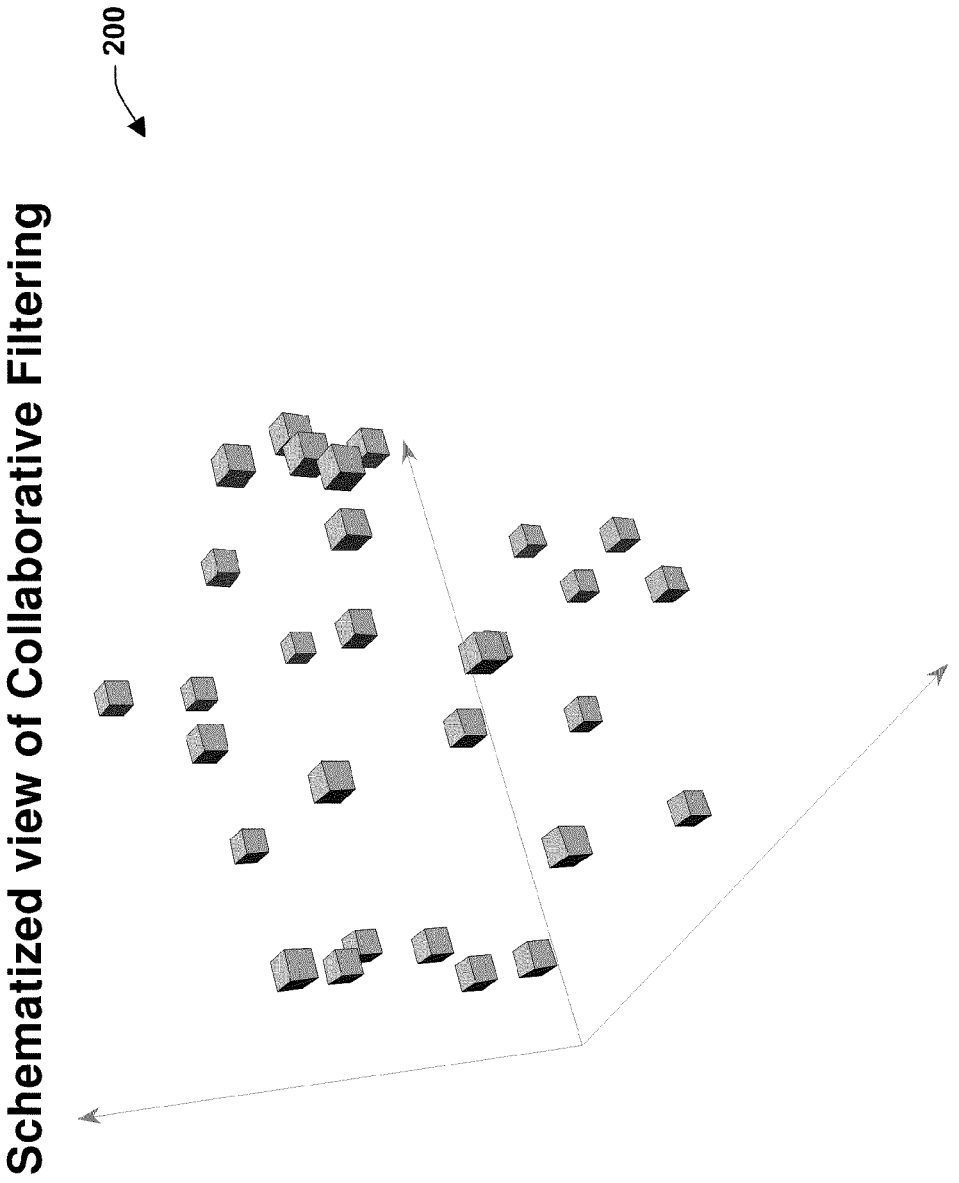

FIG. 2

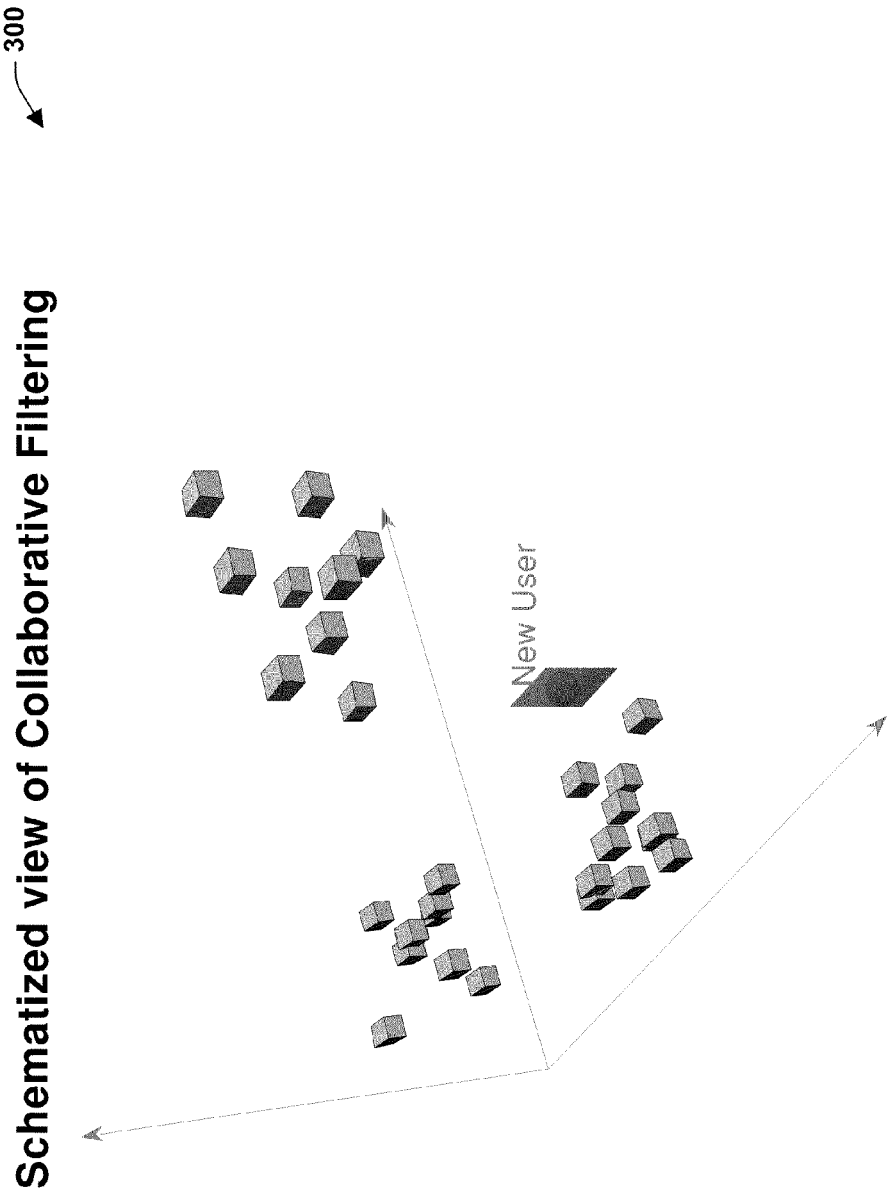

FIG. 3

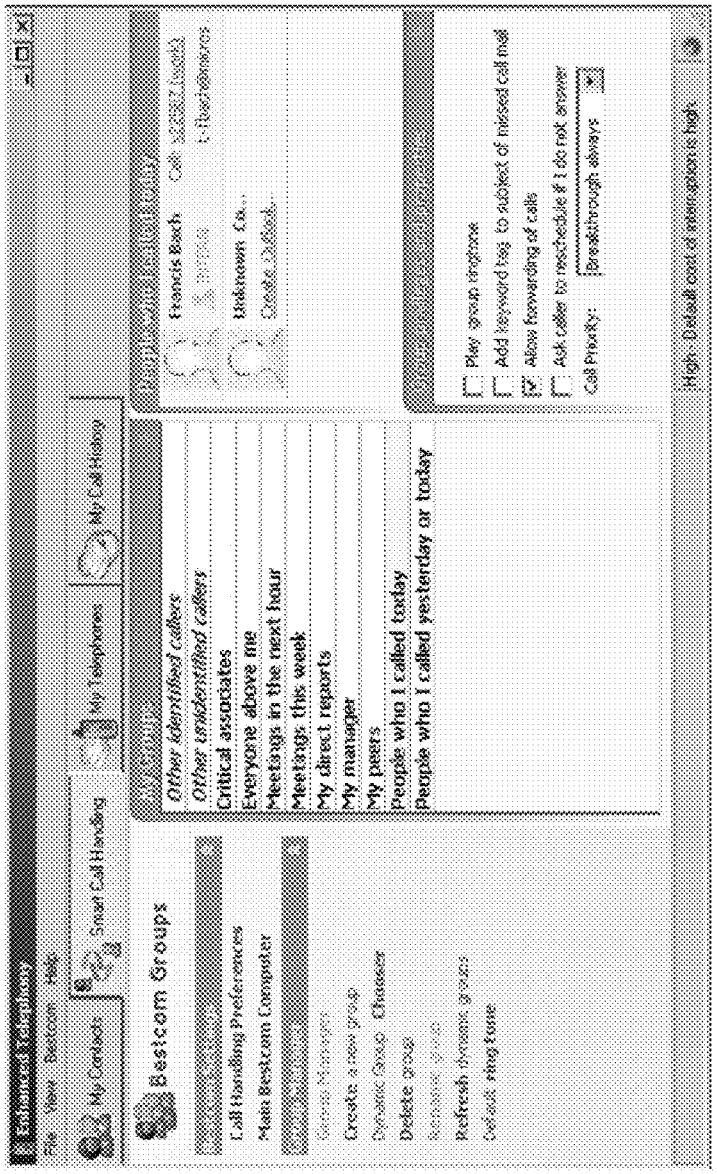
400
My Contacts
Smart Call Handling
My Telephones
My Call History
Bestcom Groups
Other identified callers
Other unidentified callers
Critical associates
Everyone above me
Meetings in the next hour
Meetings this week
My direct reports
My manager
My peers
People who I called today
People who I called yesterday or today
Call Handling Preferences
Main Bestcom Computer
Create a new group
Delete group
Refresh dynamic groups
Default ring tone
Francis Bach
Unknown Ca...
Play group ringtone
Add keyword tag to subject of missed call mail
Allow forwarding of calls
Ask caller to reschedule if I do not answer
Call Priority:
Breakthrough always
High - Default cost of interruption is high

FIG. 4

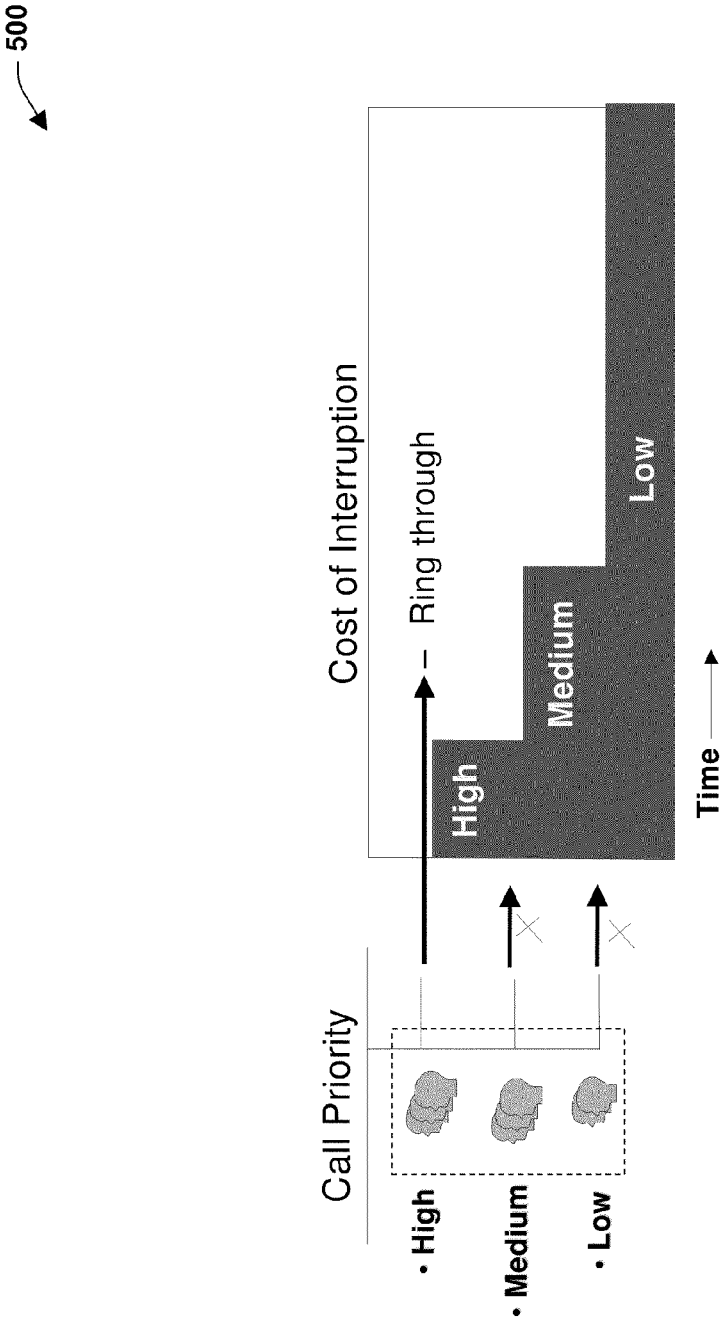
500
Cost of Interruption
Ring through
High
Medium
Low
Time
Call Priority
• High
• Medium
• Low

FIG. 5

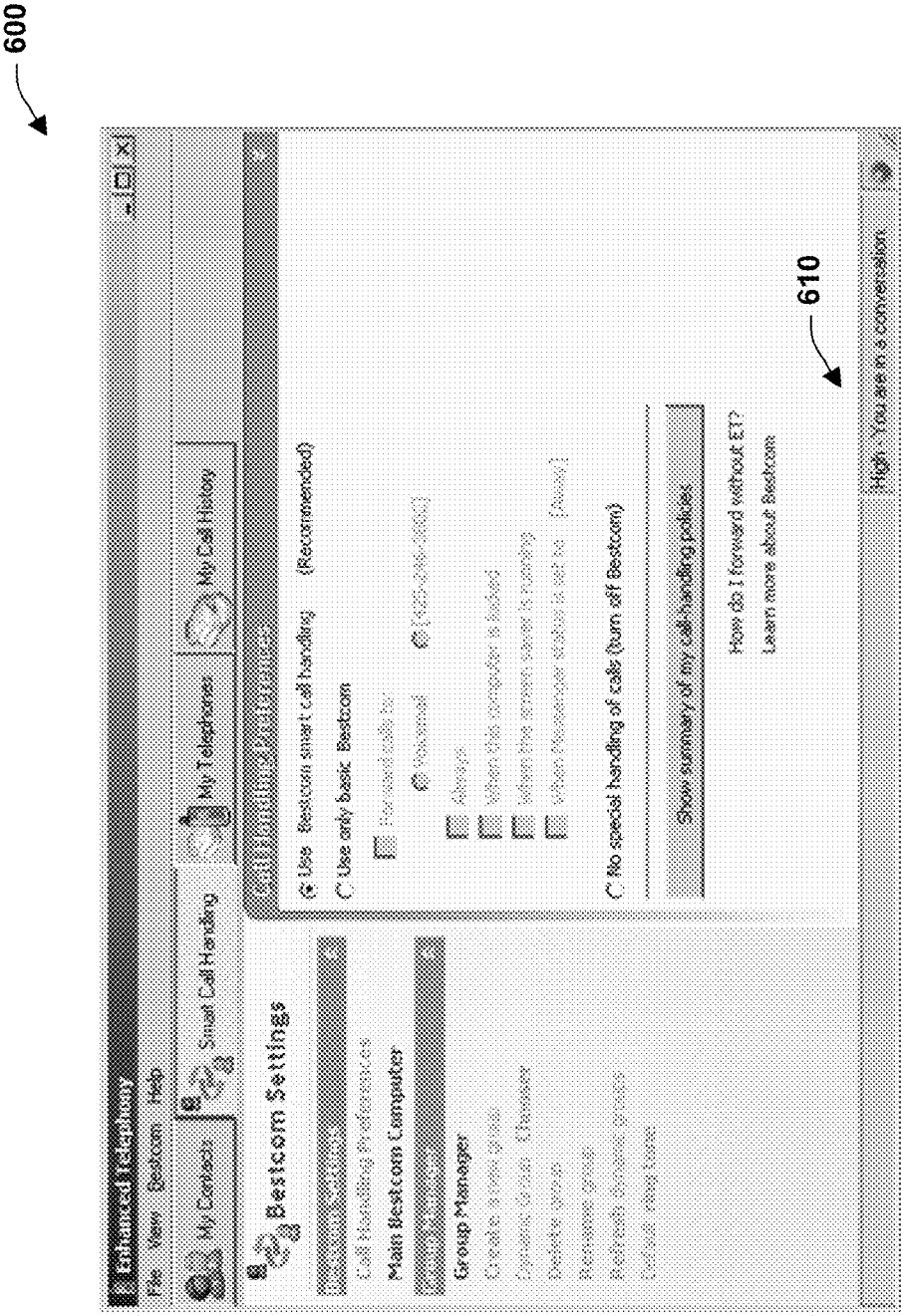
600
Enhanced Telephony
File View Bestcom Help
My Contacts
Smart Call Handling
My Telephones
My Call History
Bestcom Settings
Call Handling Preferences
Main Bestcom Computer
Group Manager
Use Bestcom smart call handling (Recommended)
Use only basic Bestcom
Forward calls to:
Always
When the computer is locked
When the screen saver is running
When Messenger status is set to (Away)
No special handling of calls (turn off Bestcom)
Show summary of my call handling policies
How do I forward without ET?
Learn more about Bestcom
610
High. You are in a conversation

FIG. 6

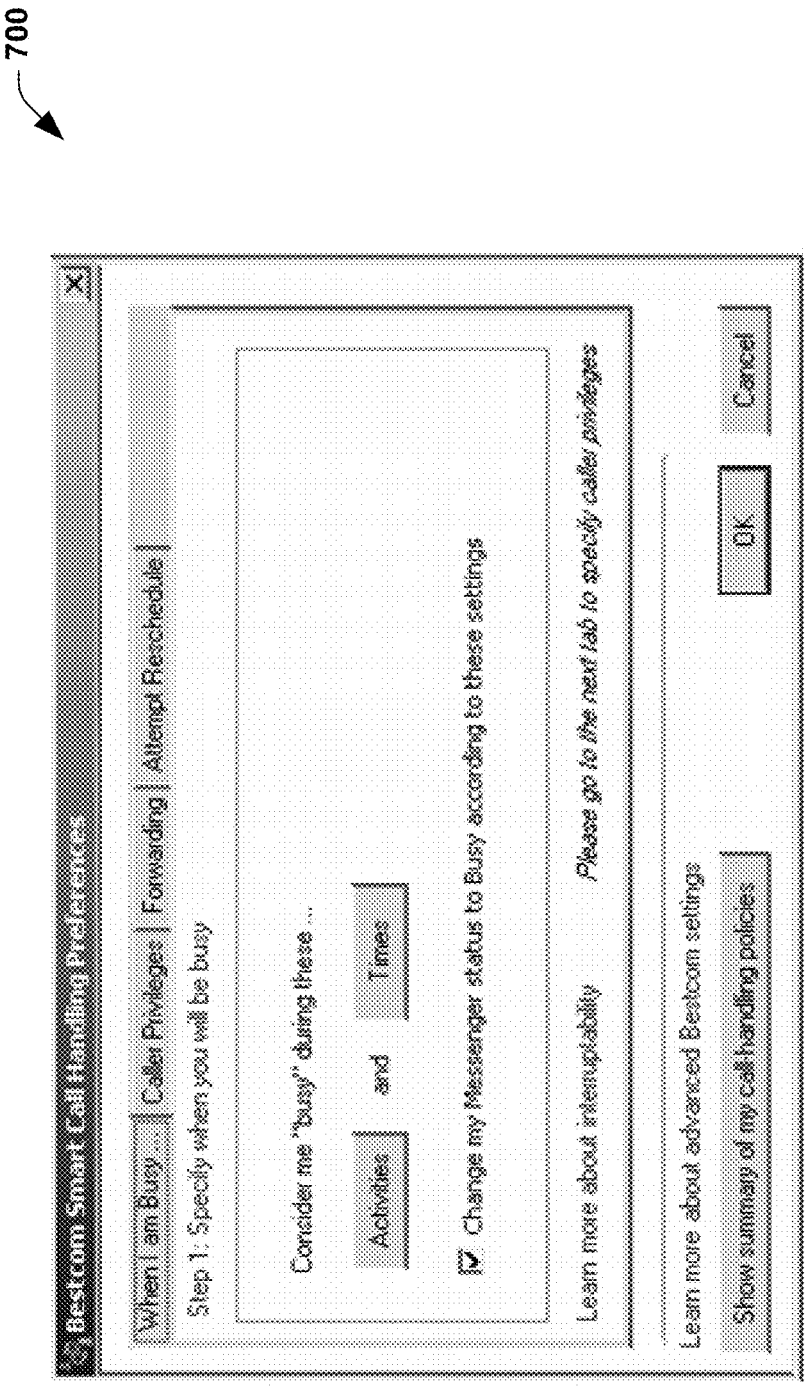
700
When I am Busy... | Caller Privileges | Forwarding | Attend Reschedule
Step 1: Specify when you will be busy
Consider me "busy" during these ...
Activities
and
Times
Change my Messenger status to Busy according to these settings
Learn more about interruptability
Please go to the next tab to specify caller privileges
Learn more about advanced Bestcom settings
Show summary of my call handling policies
OK
Cancel

FIG. 7

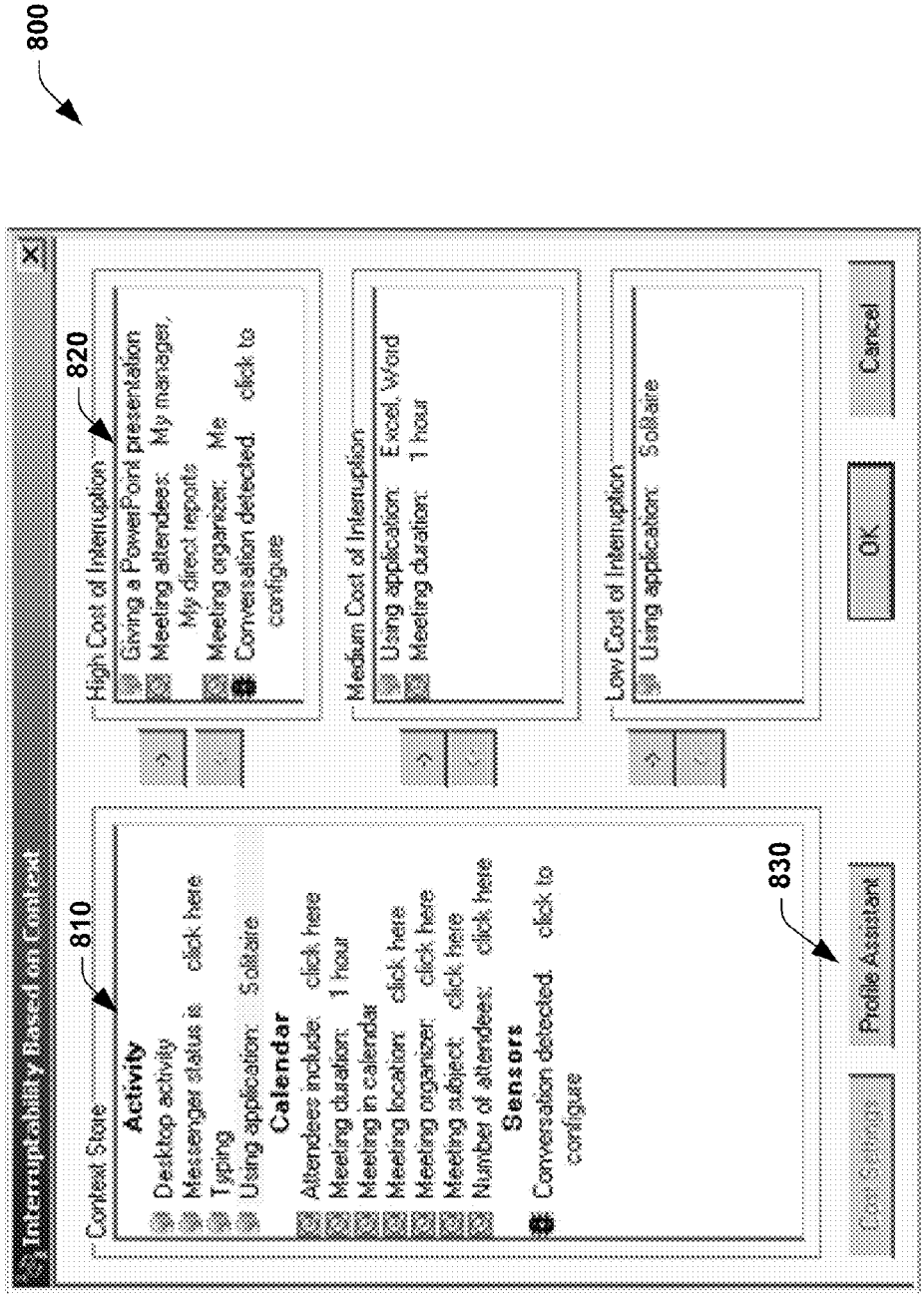
800
Interruptibility Based on Context
Context Store
810
Activity
Desktop activity
Messenger status is click here
Typing
Using application Solitaire
Calendar
Attendees include click here
Meeting duration 1 hour
Meeting in calendar
Meeting location click here
Meeting organizer click here
Meeting subject click here
Number of attendees click here
Sensors
Conversation detected click to configure
Profile Assistant
830
High Cost of Interruption
820
Giving a PowerPoint presentation
Meeting attendees My manager, My direct reports
Meeting organizer Me
Conversation detected click to configure
Medium Cost of Interruption
Using application Excel, Word
Meeting duration 1 hour
Low Cost of Interruption
Using application Solitaire
OK
Cancel

FIG. 8

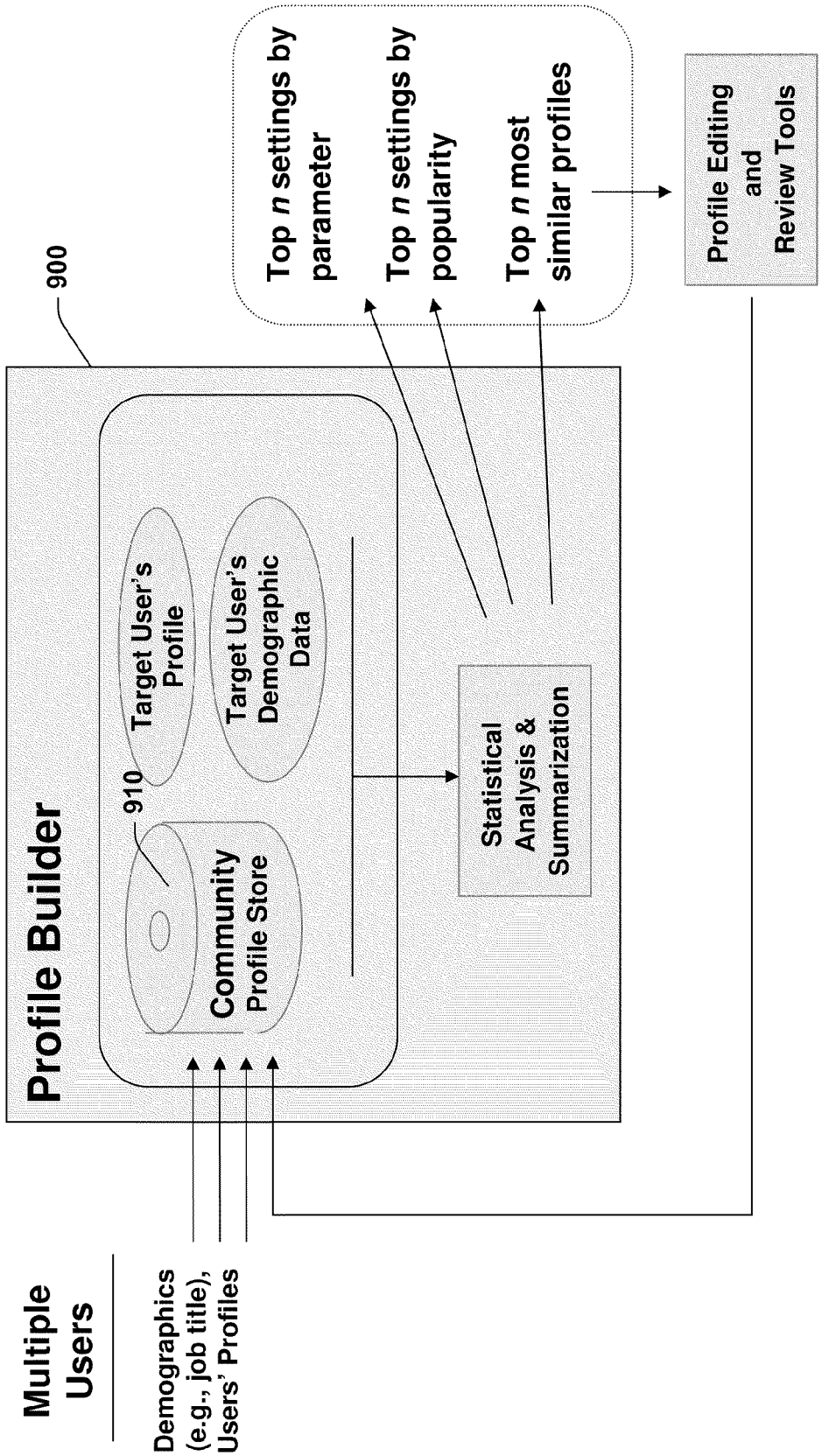
Multiple Users
Demographics (e.g., job title), Users' Profiles
Profile Builder
900
910
Community Profile Store
Target User's Profile
Target User's Demographic Data
Statistical Analysis & Summarization
Top n settings by parameter
Top n settings by popularity
Top n most similar profiles
Profile Editing and Review Tools

FIG. 9

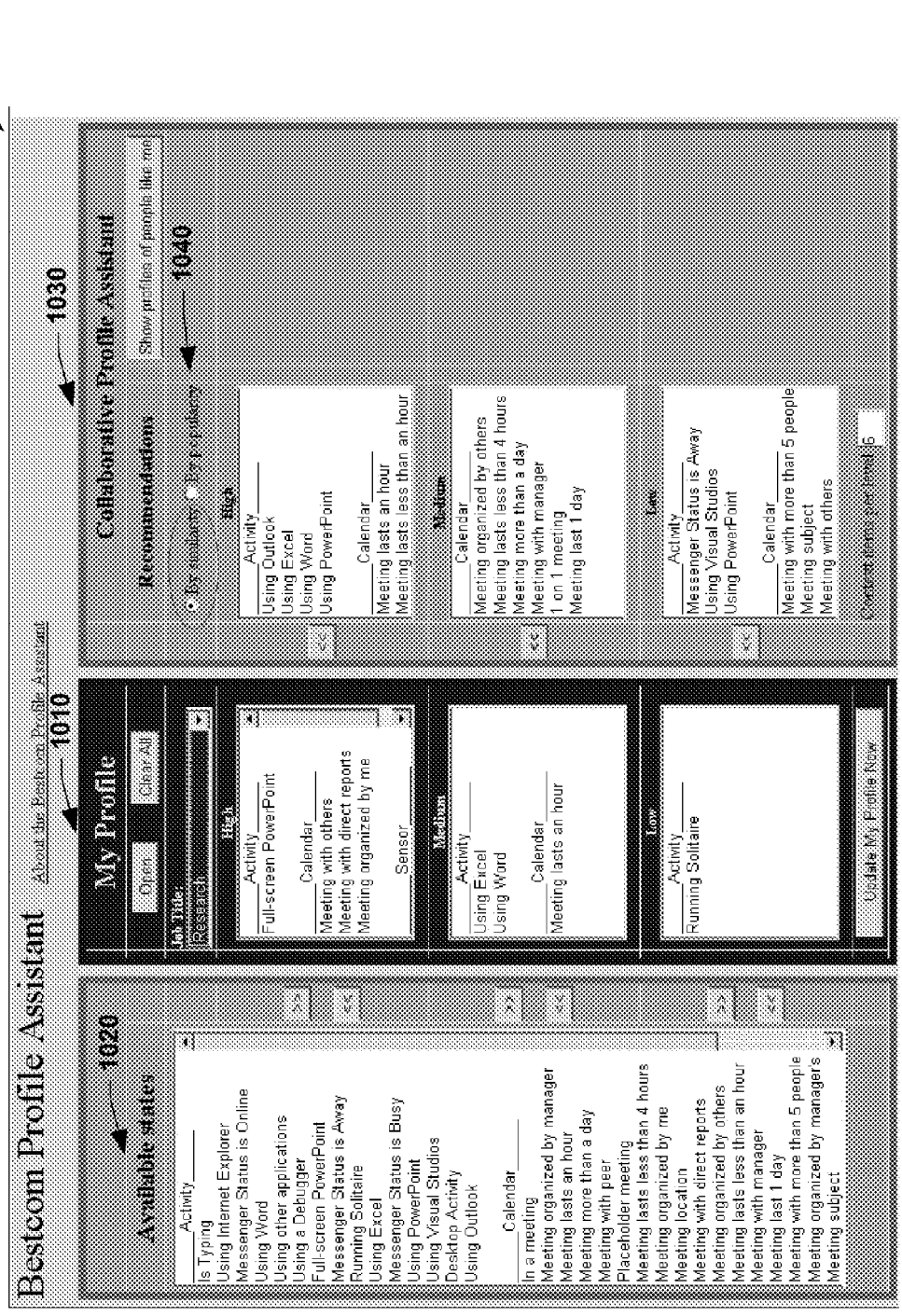
1000
1010
1020
1030
1040
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by managers
Meeting subject
My Profile
Open
Clear All
Job Title:
Research
High
Activity
Full-screen PowerPoint
Calendar
Meeting with others
Meeting with direct reports
Meeting organized by me
Sensor
Medium
Activity
Using Excel
Using Word
Calendar
Meeting lasts an hour
Low
Activity
Running Solitaire
Update My Profile Now
Collaborative Profile Assistant
Recommendations
Show profiles of people like me
By relevancy
By proximity
High
Activity
Using Outlook
Using Excel
Using Word
Using PowerPoint
Calendar
Meeting lasts an hour
Meeting lasts less than an hour
Medium
Calendar
Meeting organized by others
Meeting lasts less than 4 hours
Meeting more than a day
Meeting with manager
1 on 1 meeting
Meeting last 1 day
Low
Activity
Messenger Status is Away
Using Visual Studios
Using PowerPoint
Calendar
Meeting with more than 5 people
Meeting subject
Meeting with others
Current items per level: 5

FIG. 10

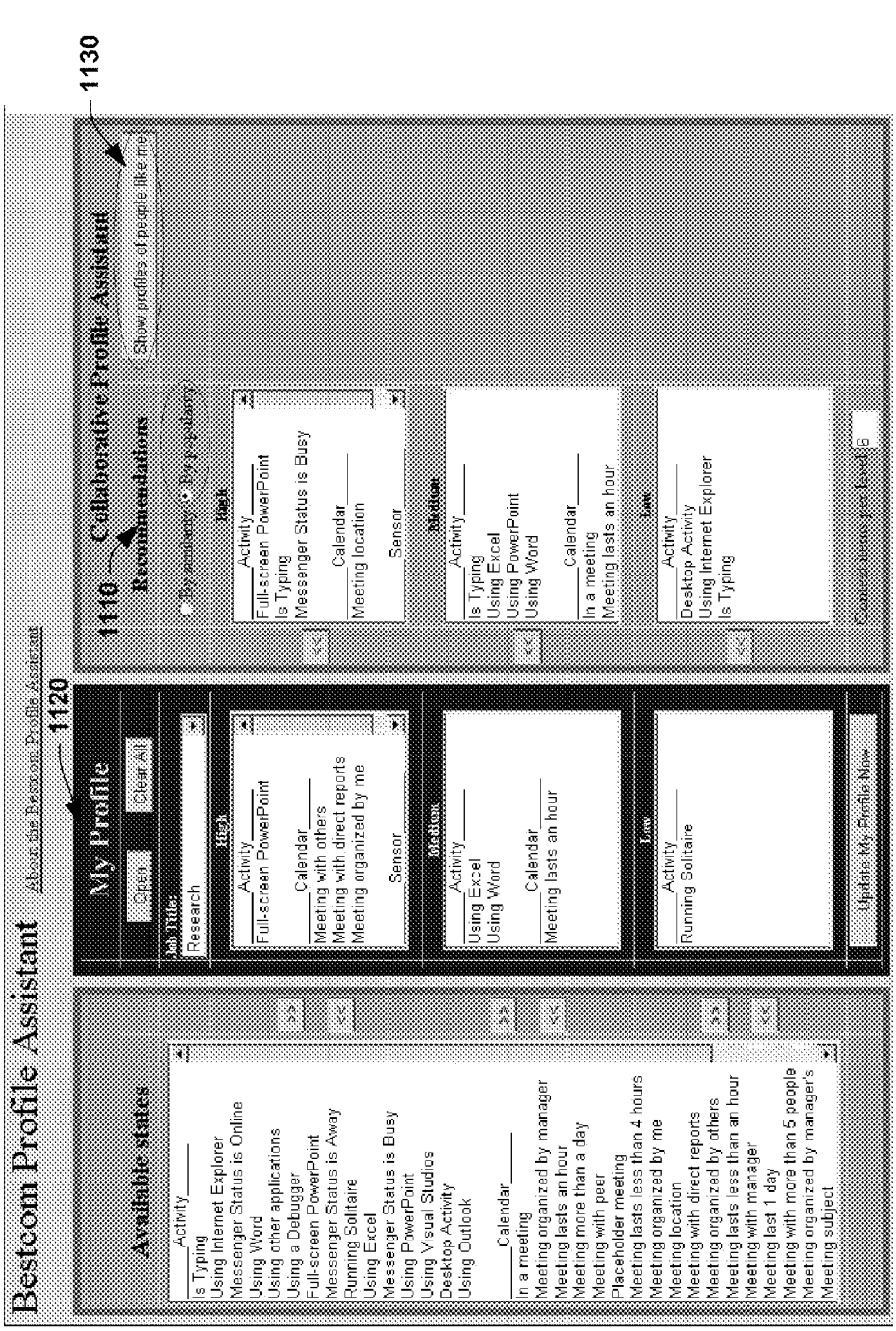
1100
1130
1120
1110
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title:
Research
High
Activity
Full-screen PowerPoint
Calendar
Meeting with others
Meeting with direct reports
Meeting organized by me
Sensor
Medium
Activity
Using Excel
Using Word
Calendar
Meeting lasts an hour
Low
Activity
Running Solitaire
Update My Profile Now
Collaborative Profile Assistant
Show profiles of people like me
Recommendations
By similarity
By popularity
High
Activity
Full-screen PowerPoint
Is Typing
Messenger Status is Busy
Calendar
Meeting location
Sensor
Medium
Activity
Is Typing
Using Excel
Using PowerPoint
Using Word
Calendar
In a meeting
Meeting lasts an hour
Low
Activity
Desktop Activity
Using Internet Explorer
Is Typing
Conversations per level
6

FIG. 11

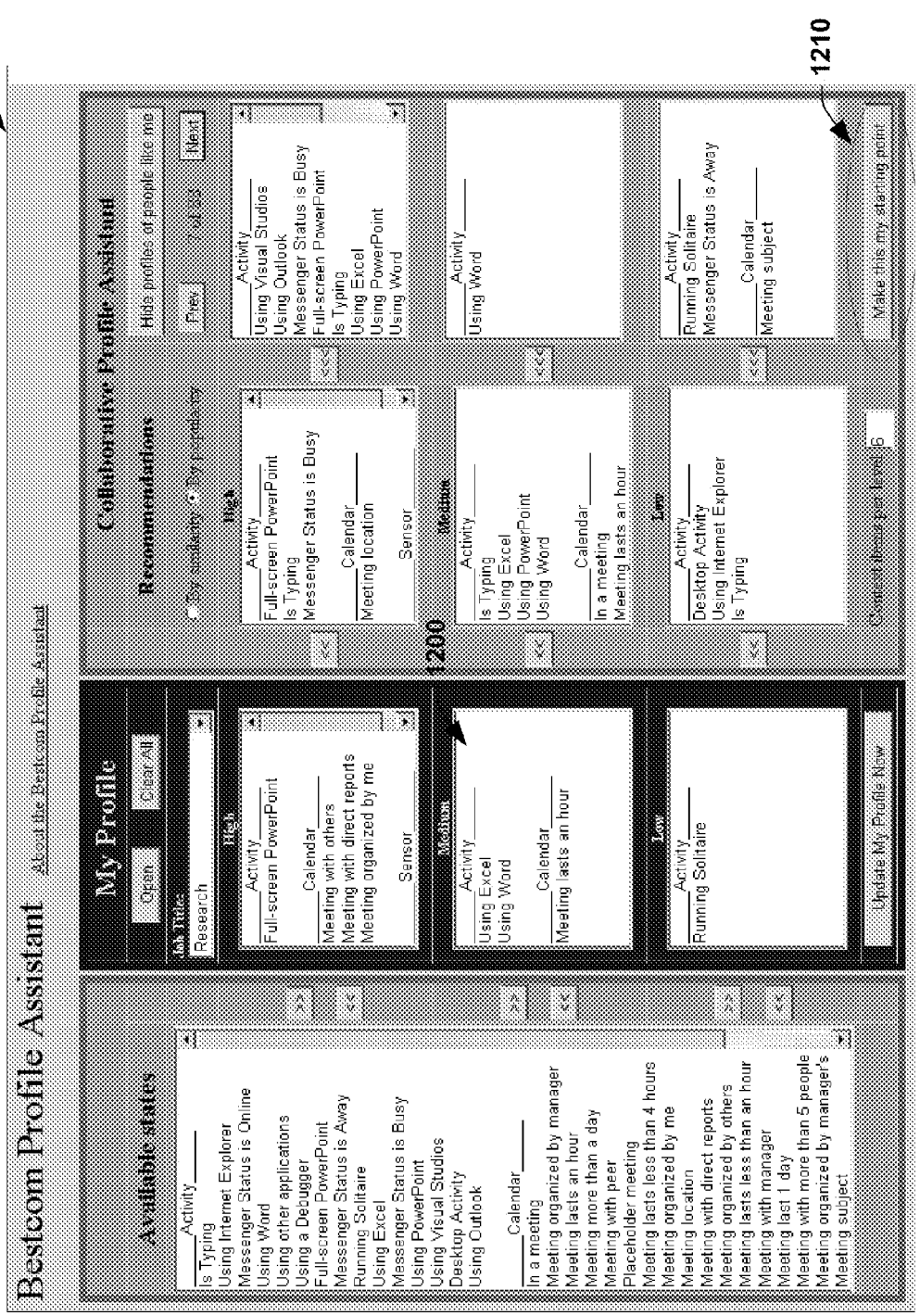
1200
1210
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title
Research
High
Activity
Full-screen PowerPoint
Calendar
Meeting with others
Meeting with direct reports
Meeting organized by me
Sensor
Medium
Activity
Using Excel
Using Word
Calendar
Meeting lasts an hour
Low
Activity
Running Solitaire
Update My Profile Now
Collaborative Profile Assistant
Hide profiles of people like me
Prev
Next
Recommendations
By similarity
By popularity
High
Activity
Full-screen PowerPoint
Is Typing
Messenger Status is Busy
Calendar
Meeting location
Sensor
Activity
Using Visual Studios
Using Outlook
Messenger Status is Busy
Full-screen PowerPoint
Is Typing
Using Excel
Using PowerPoint
Using Word
Medium
Activity
Is Typing
Using Excel
Using PowerPoint
Using Word
Calendar
In a meeting
Meeting lasts an hour
Activity
Using Word
Low
Activity
Desktop Activity
Using Internet Explorer
Is Typing
Activity
Running Solitaire
Messenger Status is Away
Calendar
Meeting subject
Make this my starting point
Contact items per level
6

FIG. 12

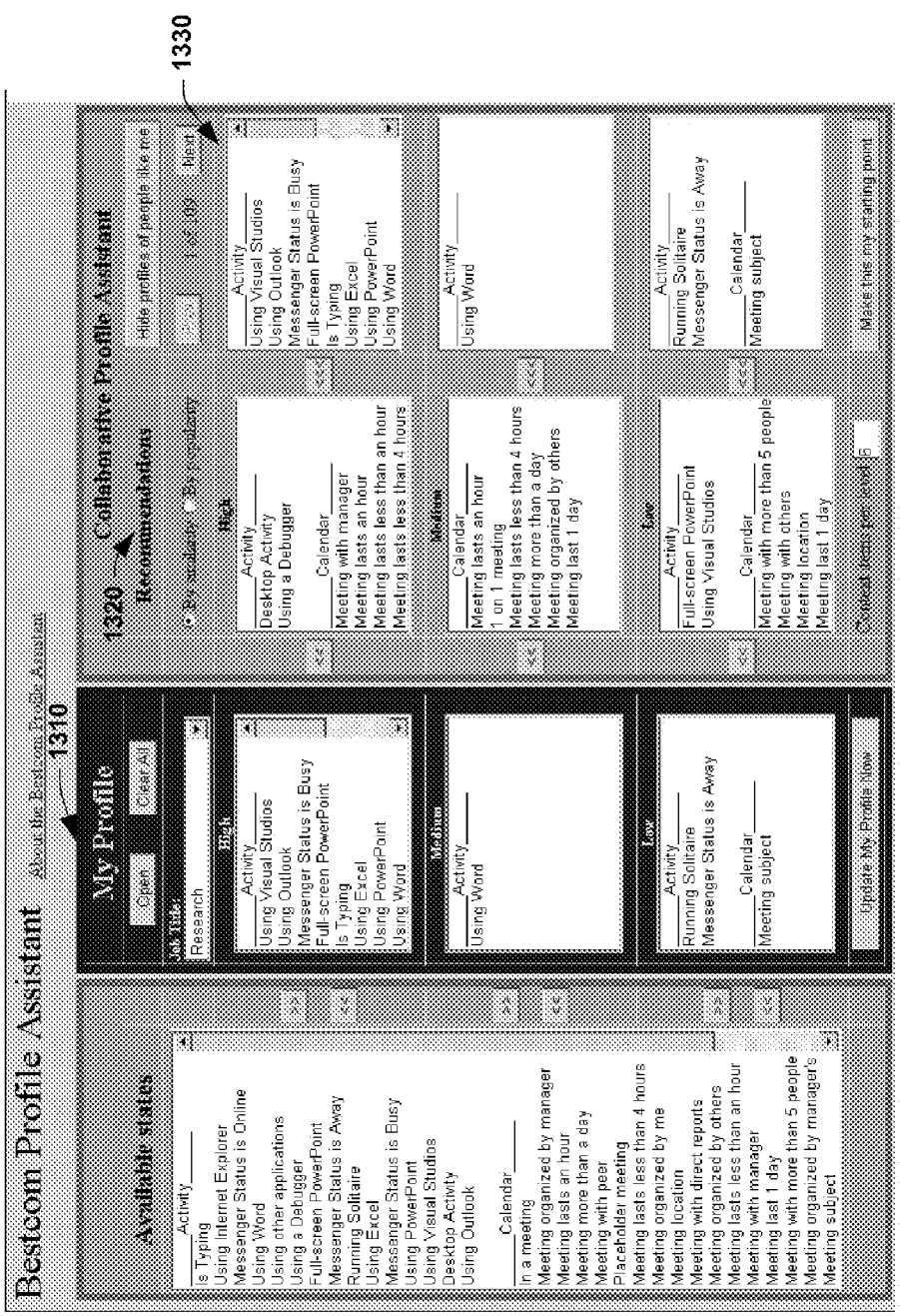
1300
1310
1320
1330
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
My Profile
Open
Clear All
Collaborative Profile Assistant
Recommendations
Hide profiles of people like me
Next
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
Update My Profile Now
Make this my starting point

FIG. 13

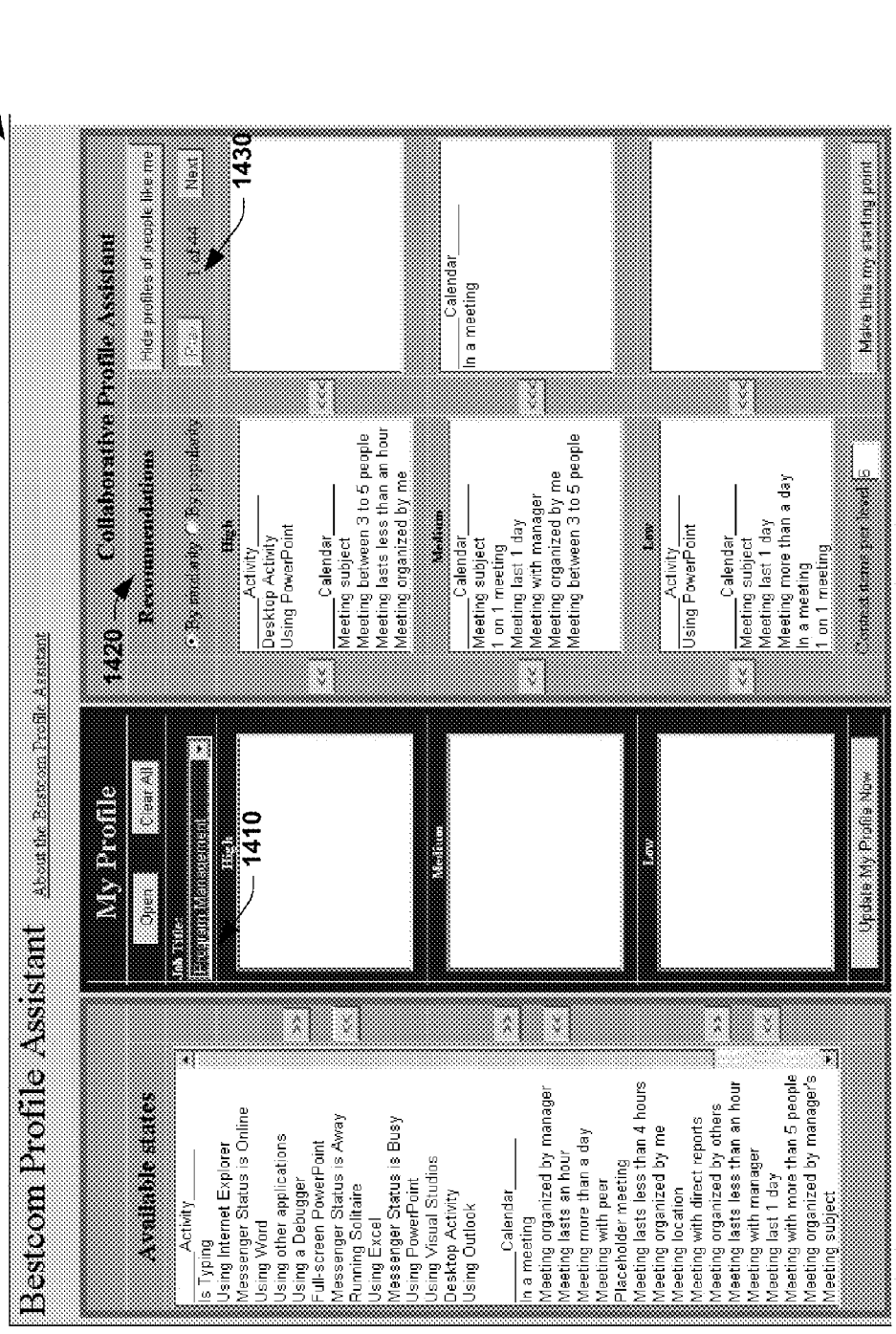
1400
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title:
Program Management
High
1410
Medium
Low
Update My Profile Now
1420
Collaborative Profile Assistant
Recommendations
By popularity
By popularity
High
Activity
Desktop Activity
Using PowerPoint
Calendar
Meeting subject
Meeting between 3 to 5 people
Meeting lasts less than an hour
Meeting organized by me
Medium
Calendar
Meeting subject
1 on 1 meeting
Meeting last 1 day
Meeting with manager
Meeting organized by me
Meeting between 3 to 5 people
Low
Activity
Using PowerPoint
Calendar
Meeting subject
Meeting last 1 day
Meeting more than a day
In a meeting
1 on 1 meeting
Hide profiles of people like me
Next
1430
Calendar
In a meeting
Make this my starting point

Fig. 14

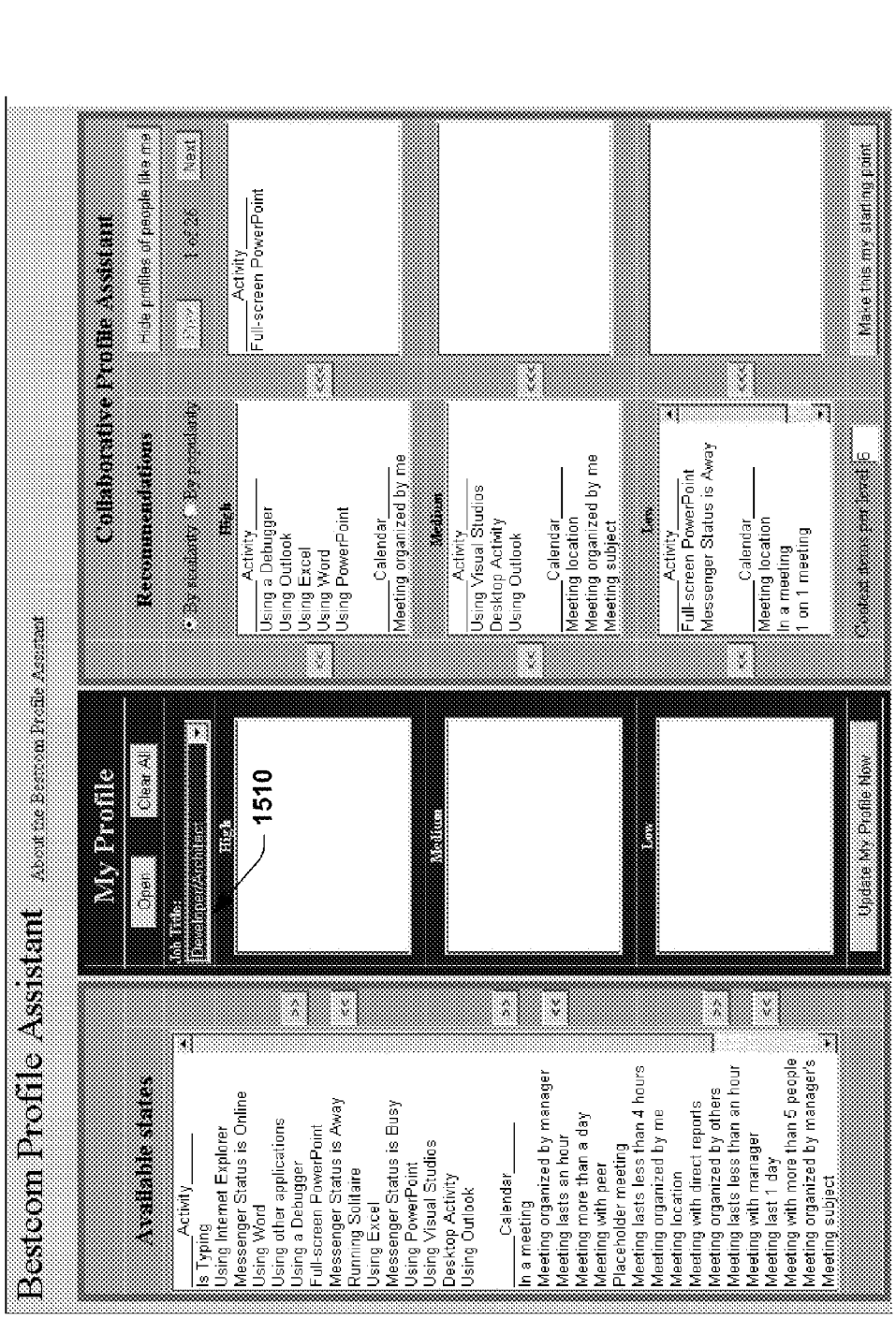
1500
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title:
Developer/Architect
High
1510
Medium
Low
Update My Profile Now
Collaborative Profile Assistant
Recommendations
By similarity
By popularity
High
Activity
Using a Debugger
Using Outlook
Using Excel
Using Word
Using PowerPoint
Calendar
Meeting organized by me
Medium
Activity
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
Meeting location
Meeting organized by me
Meeting subject
Low
Activity
Full-screen PowerPoint
Messenger Status is Away
Calendar
Meeting location
In a meeting
1 on 1 meeting
Hide profiles of people like me
Next
Activity
Full-screen PowerPoint
Make this my starting point

Fig. 15

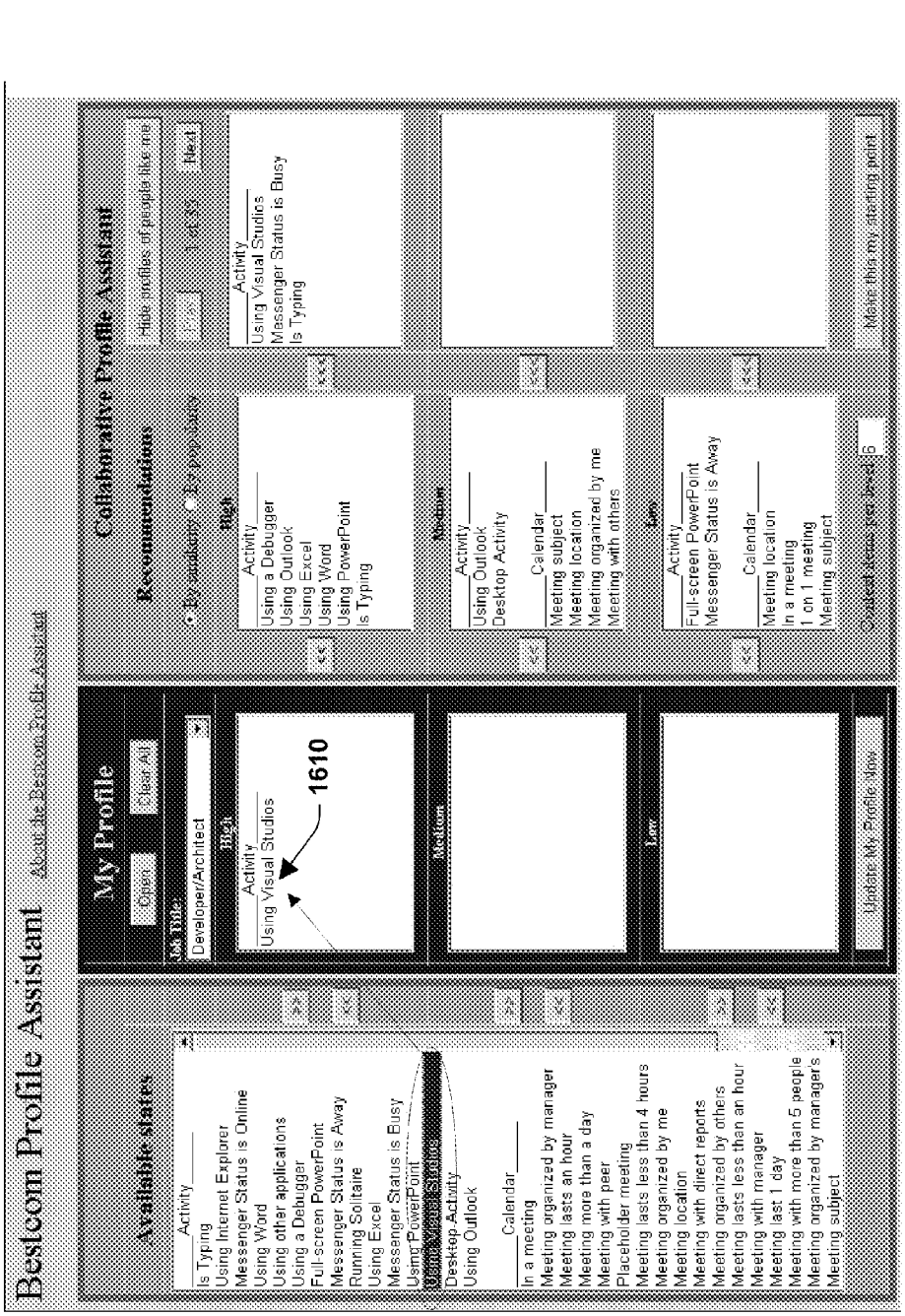
1600
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
My Title
Developer/Architect
High
Activity
Using Visual Studios
1610
Medium
Low
Update My Profile Now
Collaborative Profile Assistant
Recommendations
By similarity
By popularity
High
Activity
Using a Debugger
Using Outlook
Using Excel
Using Word
Using PowerPoint
Is Typing
Medium
Activity
Using Outlook
Desktop Activity
Calendar
Meeting subject
Meeting location
Meeting organized by me
Meeting with others
Low
Activity
Full-screen PowerPoint
Messenger Status is Away
Calendar
Meeting location
In a meeting
1 on 1 meeting
Meeting subject
Hide profiles of people like me
Next
Activity
Using Visual Studios
Messenger Status is Busy
Is Typing
Make this my starting point

FIG. 16

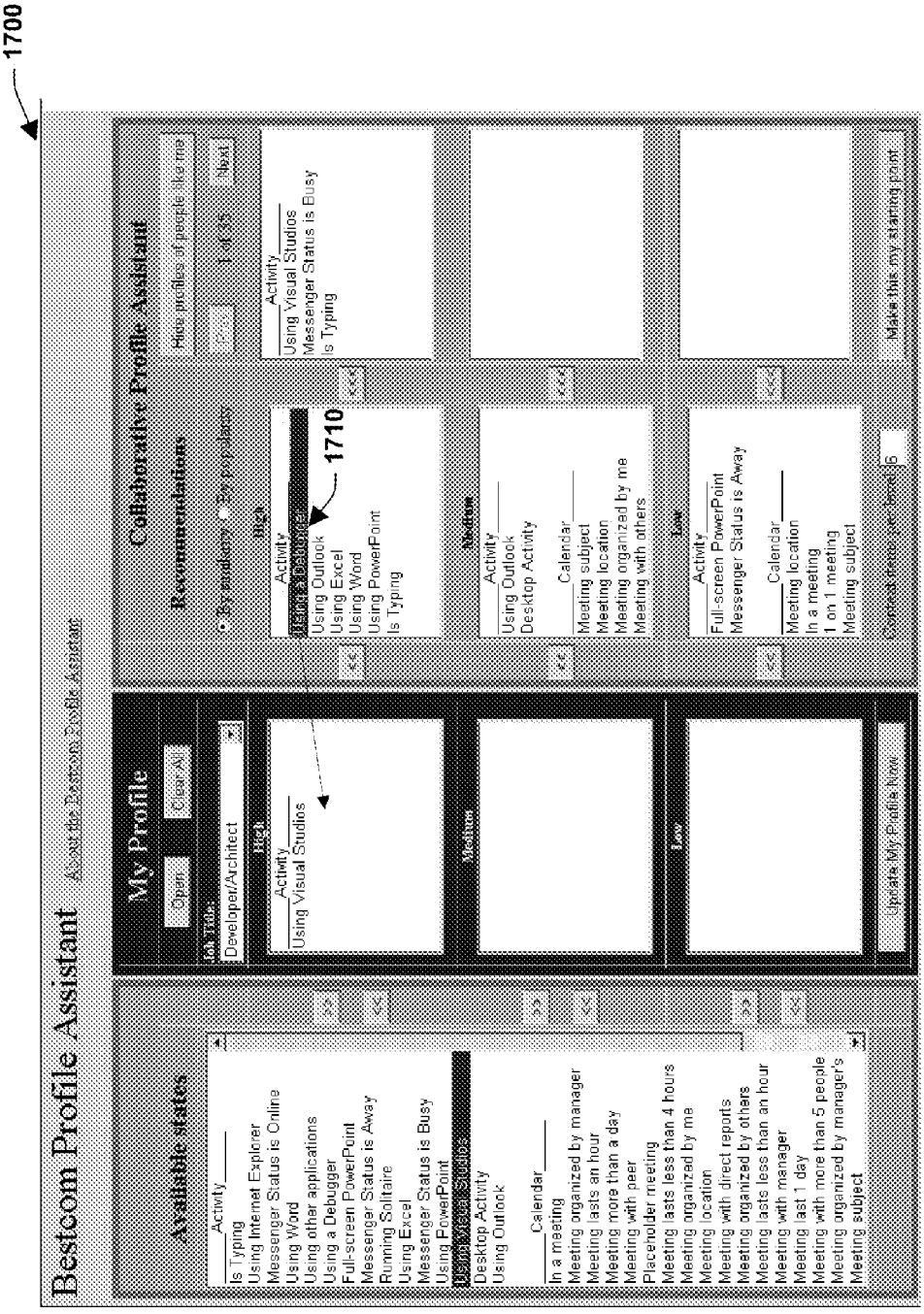
1700
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title:
Developer/Architect
High
Activity
Using Visual Studios
Medium
Low
Update My Profile Now
Collaborative Profile Assistant
Hide profiles of people like me
Prev
1 of 35
Next
Recommendations
By similarity
By popularity
High
Activity
Using a Debugger
Using Outlook
Using Excel
Using Word
Using PowerPoint
Is Typing
1710
Activity
Using Visual Studios
Messenger Status is Busy
Is Typing
Medium
Activity
Using Outlook
Desktop Activity
Calendar
Meeting subject
Meeting location
Meeting organized by me
Meeting with others
Low
Activity
Full-screen PowerPoint
Messenger Status is Away
Calendar
Meeting location
In a meeting
1 on 1 meeting
Meeting subject
Make this my starting point

FIG. 17

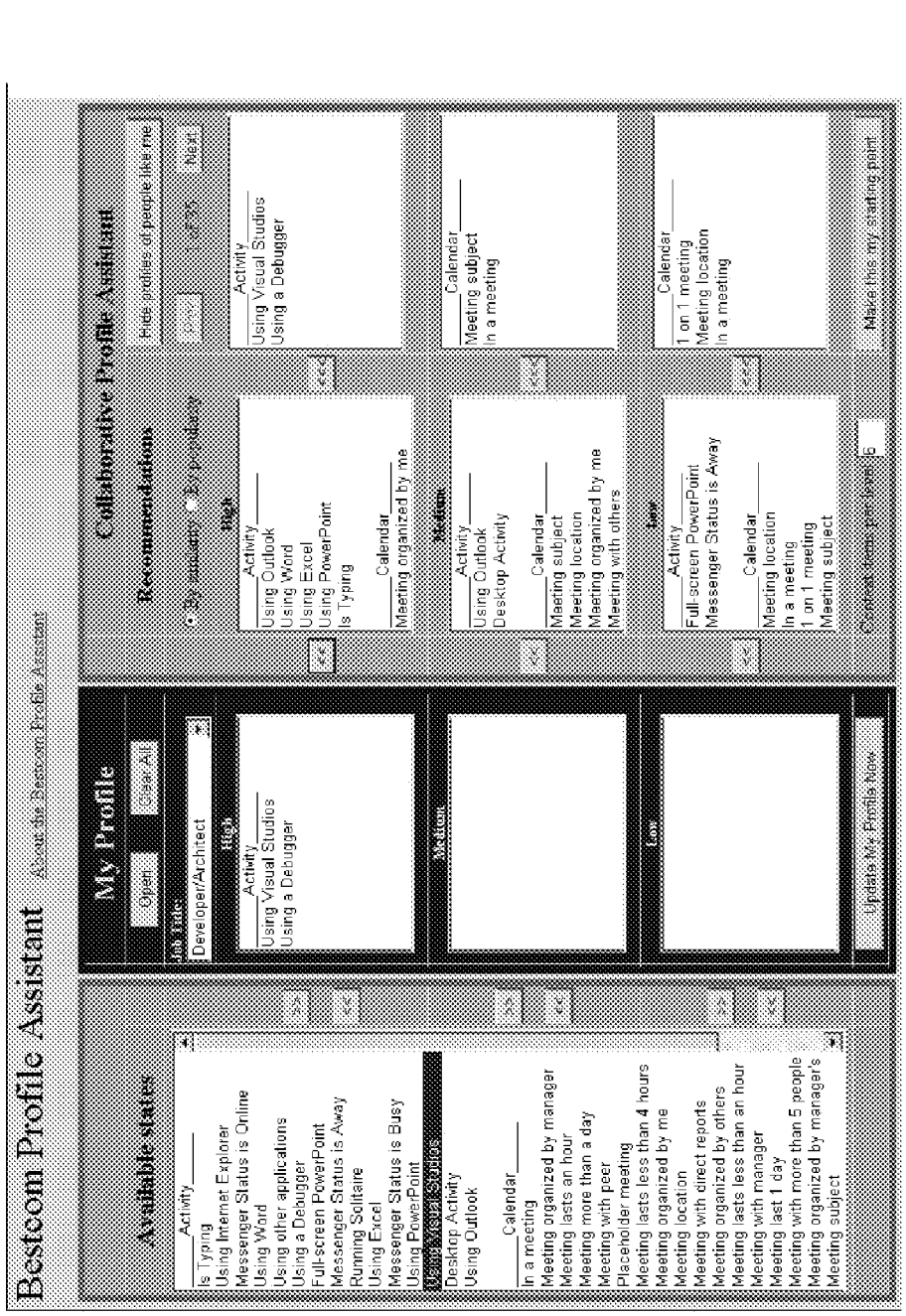
1800
Besteom Profile Assistant
About the Besteom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title:
Developer/Architect
High
Activity
Using Visual Studios
Using a Debugger
Medium
Low
Update My Profile Now
Collaborative Profile Assistant
Recommendations
Hide profiles of people like me
Next
By similarity
By popularity
High
Activity
Using Outlook
Using Word
Using Excel
Using PowerPoint
Is Typing
Calendar
Meeting organized by me
Activity
Using Visual Studios
Using a Debugger
Medium
Activity
Using Outlook
Desktop Activity
Calendar
Meeting subject
Meeting location
Meeting organized by me
Meeting with others
Calendar
Meeting subject
In a meeting
Low
Activity
Full-screen PowerPoint
Messenger Status is Away
Calendar
Meeting location
In a meeting
1 on 1 meeting
Meeting subject
Calendar
1 on 1 meeting
Meeting location
In a meeting
Make this my starting point

Fig. 18

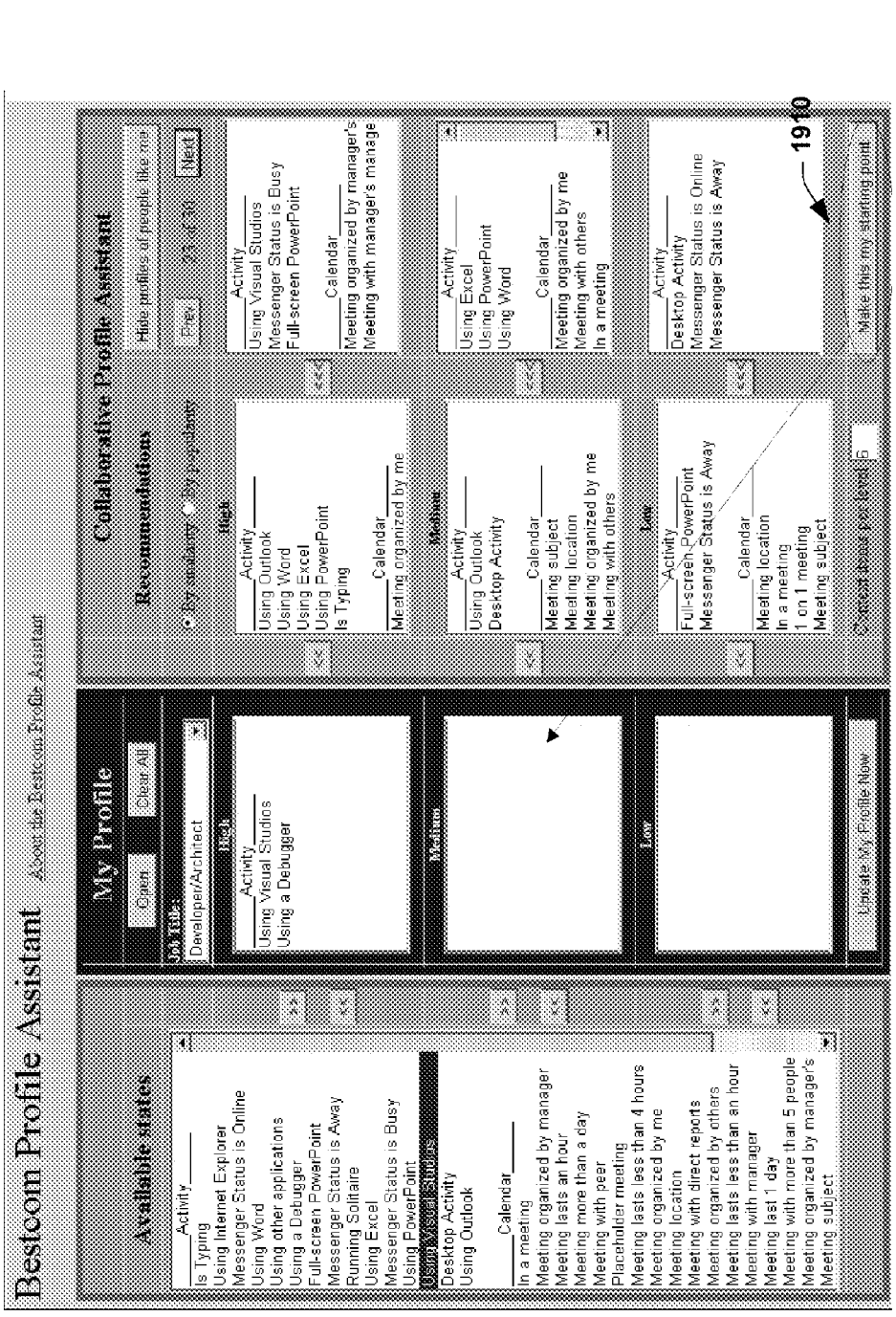
1900
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Title:
Developer/Architect
High
Activity
Using Visual Studios
Using a Debugger
Medium
Low
Update My Profile Now
Collaborative Profile Assistant
Recommendations
Hide profiles of people like me
By similarity
By participants
Prev
33 of 36
Next
High
Activity
Using Outlook
Using Word
Using Excel
Using PowerPoint
Is Typing
Calendar
Meeting organized by me
Medium
Activity
Using Outlook
Desktop Activity
Calendar
Meeting subject
Meeting location
Meeting organized by me
Meeting with others
Low
Activity
Full-screen PowerPoint
Messenger Status is Away
Calendar
Meeting location
In a meeting
1 on 1 meeting
Meeting subject
High
Activity
Using Visual Studios
Messenger Status is Busy
Full-screen PowerPoint
Calendar
Meeting organized by manager's
Meeting with manager's manage
Medium
Activity
Using Excel
Using PowerPoint
Using Word
Calendar
Meeting organized by me
Meeting with others
In a meeting
Low
Activity
Desktop Activity
Messenger Status is Online
Messenger Status is Away
1910
Select best profile
Make this my starting point

Fig. 19

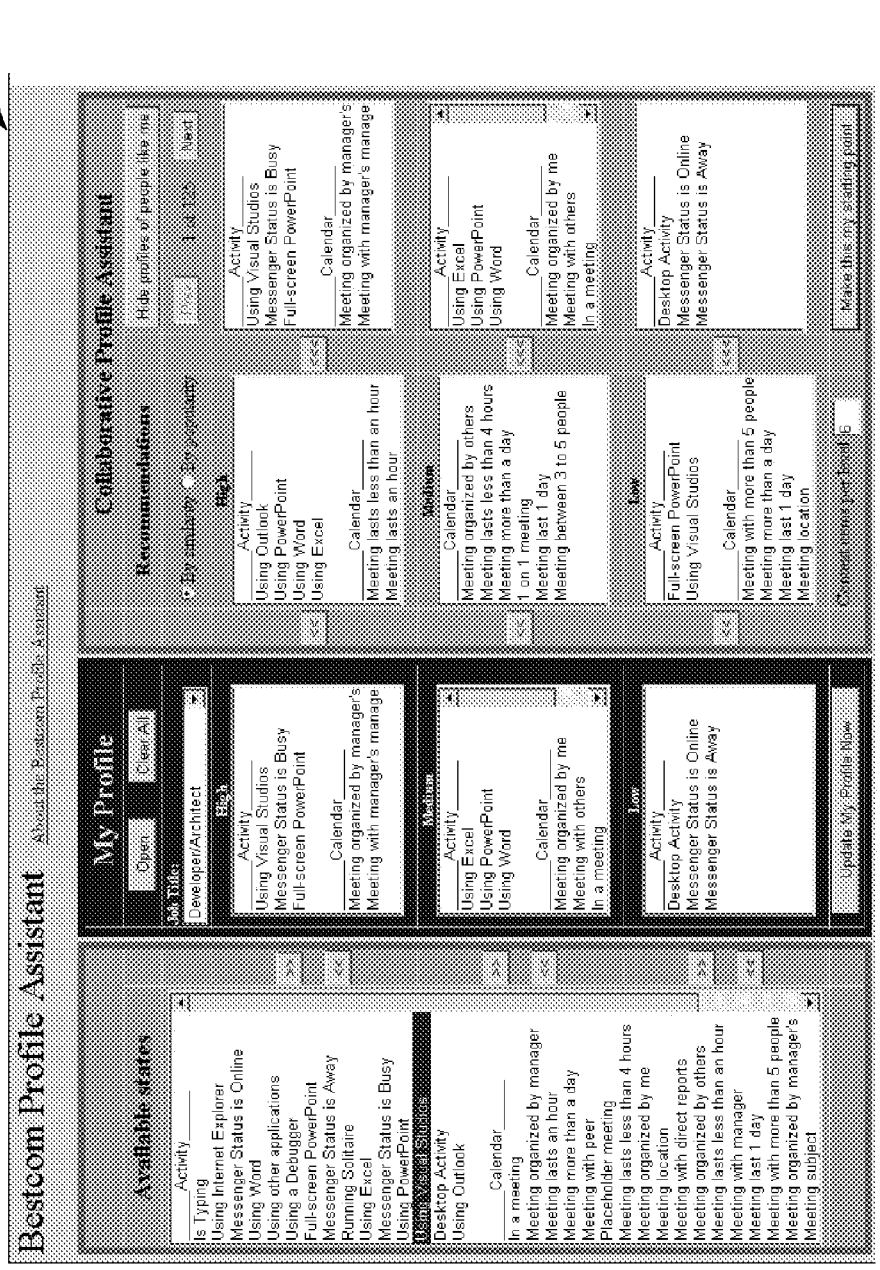
2000
Bestcom Profile Assistant
About the Bestcom Profile Assistant
Available states
Activity
Is Typing
Using Internet Explorer
Messenger Status is Online
Using Word
Using other applications
Using a Debugger
Full-screen PowerPoint
Messenger Status is Away
Running Solitaire
Using Excel
Messenger Status is Busy
Using PowerPoint
Using Visual Studios
Desktop Activity
Using Outlook
Calendar
In a meeting
Meeting organized by manager
Meeting lasts an hour
Meeting more than a day
Meeting with peer
Placeholder meeting
Meeting lasts less than 4 hours
Meeting organized by me
Meeting location
Meeting with direct reports
Meeting organized by others
Meeting lasts less than an hour
Meeting with manager
Meeting last 1 day
Meeting with more than 5 people
Meeting organized by manager's
Meeting subject
My Profile
Open
Clear All
Job Titles
Developer/Architect
High
Activity
Using Visual Studios
Messenger Status is Busy
Full-screen PowerPoint
Calendar
Meeting organized by manager's
Meeting with manager's manage
Medium
Activity
Using Excel
Using PowerPoint
Using Word
Calendar
Meeting organized by me
Meeting with others
In a meeting
Low
Activity
Desktop Activity
Messenger Status is Online
Messenger Status is Away
Update My Profile Now
Collaborative Profile Assistant
Recommendations
Hide profiles of people like me
Next
High
Activity
Using Outlook
Using PowerPoint
Using Word
Using Excel
Calendar
Meeting lasts less than an hour
Meeting lasts an hour
Medium
Calendar
Meeting organized by others
Meeting lasts less than 4 hours
Meeting more than a day
1 on 1 meeting
Meeting last 1 day
Meeting between 3 to 5 people
Low
Activity
Full-screen PowerPoint
Using Visual Studios
Calendar
Meeting with more than 5 people
Meeting more than a day
Meeting last 1 day
Meeting location
Activity
Using Visual Studios
Messenger Status is Busy
Full-screen PowerPoint
Calendar
Meeting organized by manager's
Meeting with manager's manage
Activity
Using Excel
Using PowerPoint
Using Word
Calendar
Meeting organized by me
Meeting with others
In a meeting
Activity
Desktop Activity
Messenger Status is Online
Messenger Status is Away
Make this my starting point

FIG. 20

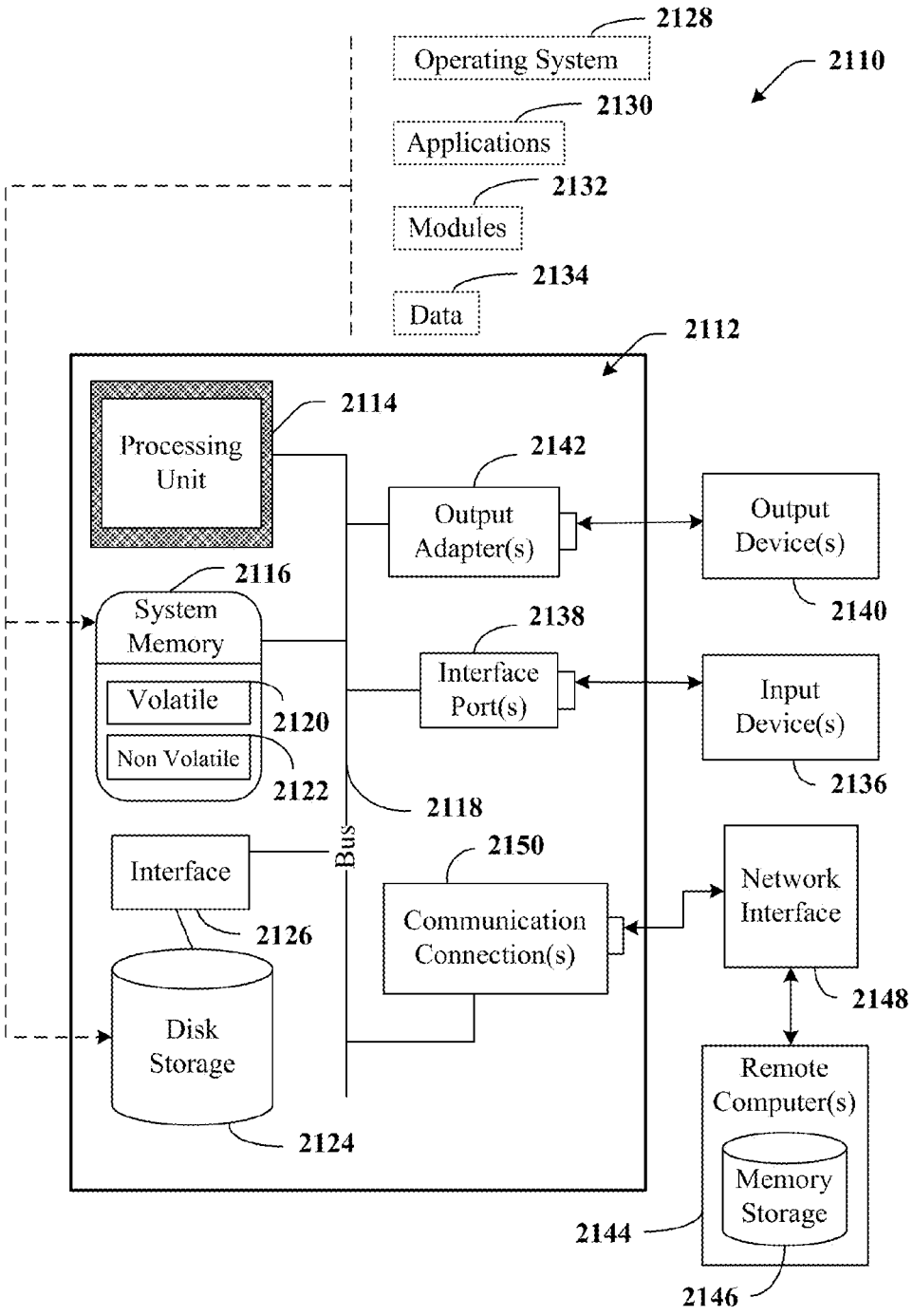
2128
Operating System
2110
2130
Applications
2132
Modules
2134
Data
2112
2114
Processing Unit
2142
Output Adapter(s)
Output Device(s)
2140
2116
System Memory
Volatile
2120
Non Volatile
2122
2138
Interface Port(s)
Input Device(s)
2136
2118
Bus
Interface
2126
2150
Communication Connection(s)
Network Interface
2148
Disk Storage
2124
Remote Computer(s)
Memory Storage
2144
2146

FIG. 21

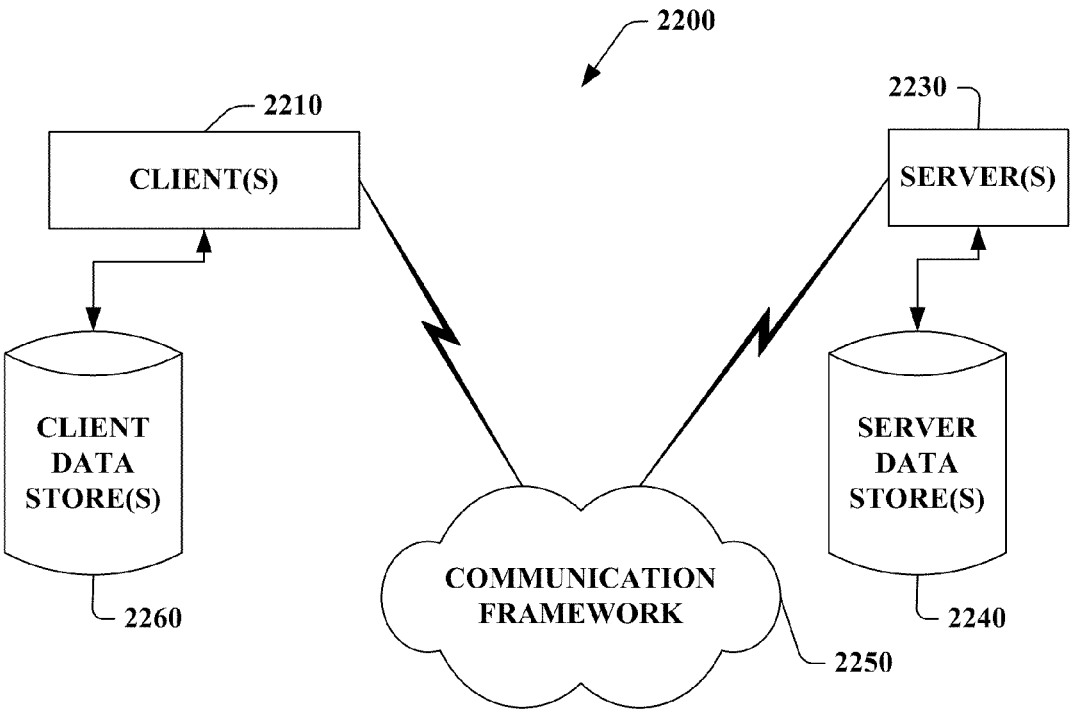
2200
2210
CLIENT(S)
2230
SERVER(S)
CLIENT DATA STORE(S)
SERVER DATA STORE(S)
COMMUNICATION FRAMEWORK
2260
2240
2250

FIG. 22

STATISTICAL MODELS AND METHODS TO SUPPORT THE PERSONALIZATION OF APPLICATIONS AND SERVICES VIA CONSIDERATION OF PREFERENCE ENCODINGS OF A COMMUNITY OF USERS

RELATED APPLICATION

This application claims priority to U.S. Provisional Patent Application Ser. No. 60/528,597 filed on, Dec. 11, 2003 and entitled STATISTICAL MODELS AND METHODS TO SUPPORT THE PERSONALIZATION OF APPLICATIONS AND SERVICES VIA CONSIDERATION OF PREFERENCE ENCODINGS OF A COMMUNITY OF USERS, the entire contents of which are herein incorporated by reference.

TECHNICAL FIELD

The present invention relates generally to software and/or systems management and more particularly to systems and methods that analyze preference settings from a community of users to build potential settings profiles to assist new users when configuring complex computing and communications systems.

BACKGROUND OF THE INVENTION

Modern computing systems support a large number of applications serving a large number of diverse users. Even though hardware processing and memory has continued to increase in performance, software continues to outpace these advances in the number of new features that are developed to support new and existing applications. Using the cell phone as an example, many features are available for setting desired operations of the device including the type and loudness of a ring, phone directories, menu commands, inbox settings, display settings, security settings, and so forth. In addition to phone capabilities, other hardware features and associated software are beginning to appear on cell phones such as digital cameras and web services. In more complicated systems such as operating systems, software development systems, or advanced communications architectures, the number of settings to tune a particular environment to a particular user's taste or comfort level can be daunting.

In order to configure more complex systems, such as rule-based systems or statistically guided automated reasoning, according to desired preferences, users are often given the task of reading through a large digest of written material either electronic or paper and then experimenting with a system to see if the adjustments made are suitable. Such experimentation can be tedious and take more time than a user desires to invest in refining settings. As can be appreciated, this type of experimental learning process can be tedious and frustrating. In an alternative form of learning on a complex system, users are may be manually trained by another user, wherein the person supplying the training most often only conveys basic information about the system due to time constraints. Possibly worse scenarios also exist during manual training by a colleague. In these cases, the person supplying the training typically only conveys those features that are relevant to the person giving the directions. Thus, many users likely do not experience the full power and utility of a computing system and associated software.

SUMMARY OF THE INVENTION

The following presents a simplified summary of the invention in order to provide a basic understanding of some aspects of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key or critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some concepts of the invention in a simplified form as a prelude to the more detailed description that is presented later.

The subject invention facilitates personalization of software applications and services. More particularly, statistical models and methods are employed to support personalization of applications and services via consideration of preference encodings of a community of users. Based upon an analysis of data from the community, potential profiles are created or suggested that users may employ as their personal settings for a system, whereby the profiles have the benefit of being selected as currently useful by the greater community of users who may also share similar features with a given user. For example, the invention mitigates problems associated with setting up conventional routing or computing systems by users that may have difficulty assessing and determining desired settings for complex systems, wherein the subject invention can employ automatic techniques such as statistical inference of a database of settings to facilitate recommendations for profile settings.

One particular aspect of the invention, in connection with profile construction and selection, considers demographics, usage, existing profiles as well as various extrinsic data that may provide for example context to a particular personalization effort. Another aspect of the invention employs inference methods in connection with personalization. For example, collaborative filtering, popularity analysis, demographic analysis, and a variety of clustering methods can be employed to analyze a database of preferences stored by a community of users to determine a potential profile or profiles of preferences that may be suitable for a given user, taking into consideration some partial information about the user or the settings. Other features can include enabling users to define properties about themselves in order to take advantage of potential settings from other users that have similar needs and performance requirements. This includes allowing direct inspection and/or selection of one or more other similar profiles from which the current profile has been synthesized. Other automated techniques include querying users with a set or subset of questions to determine another set of questions that can then be used to direct how best to configure and employ a given system. As can be appreciated, when new profile settings are selected, automated models in the system can provide predictions as to possible future system performance based upon the changed settings (e.g., if this setting is changed, you will receive 20% more medium priority messages per day).

To the accomplishment of the foregoing and related ends, certain illustrative aspects of the invention are described herein in connection with the following description and the annexed drawings. These aspects are indicative, however, of but a few of the various ways in which the principles of the invention may be employed and the present invention is intended to include all such aspects and their equivalents. Other advantages and novel features of the invention may become apparent from the following detailed description of the invention when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a system and interface for generating personalized profiles in accordance with an aspect of the present invention.

FIGS. **2-3** illustrate example collaborative filtering diagrams in accordance with an aspect of the present invention.

FIGS. **3-8** illustrate example cost benefit concepts, interruption concepts, and user interfaces in accordance with an aspect of the present invention.

FIG. **9** is a block diagram of a profile builder in accordance with an aspect of the present invention.

FIGS. **10-20** illustrate example profile interfaces in accordance with an aspect of the present invention.

FIG. **21** is a schematic block diagram illustrating a suitable operating environment in accordance with an aspect of the present invention.

FIG. **22** is a schematic block diagram of a sample-computing environment with which the present invention can interact.

DETAILED DESCRIPTION

The present invention relates to systems and methods that automatically generate potential or suggested profile settings for various computer applications. A storage component receives data relating to a community of users, whereby the data is related to profile or settings preferences of the community. An analyzer processes the community data and information relating to existing profiles in order to provide recommendations to the user in connection with building a personalized profile. The analyzer can employ various statistical and modeling techniques such as collaborative filtering to determine the personalized profile.

As used in this application, the terms "component," "model," "system," "analyzer," "builder," and the like are intended to refer to a computer-related entity, either hardware, a combination of hardware and software, software, or software in execution. For example, a component may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a server and the server can be a component. One or more components may reside within a process and/or thread of execution and a component may be localized on one computer and/or distributed between two or more computers. Also, these components can execute from various computer readable media having various data structures stored thereon. The components may communicate via local and/or remote processes such as in accordance with a signal having one or more data packets (e.g., data from one component interacting with another component in a local system, distributed system, and/or across a network such as the Internet with other systems via the signal).

As used herein, the term "inference" refers generally to the process of reasoning about or inferring states of the system, environment, and/or user from a set of observations as captured via events and/or data. Inference can be employed to identify a specific context or action, or can generate a probability distribution over states, for example. The inference can be probabilistic—that is, the computation of a probability distribution over states of interest based on a consideration of data and events. Inference can also refer to techniques employed for composing higher-level events from a set of events and/or data. Such inference results in the construction of new events or actions from a set of observed events and/or stored event data, whether or not the events are correlated in close temporal proximity, and whether the events and data come from one or several event and data sources. Furthermore, inference can be based upon logical models or rules, whereby relationships between components or data are determined by an analysis of the data and drawing conclusions therefrom. For instance, by observing that one user interacts with a subset of other users over a network, it may be determined or inferred that this subset of users belongs to a desired social network of interest for the one user as opposed to a plurality of other users who are never or rarely interacted with.

Referring initially to FIG. **1**, a system **100** illustrates an automated profile generator and interface in accordance with an aspect of the present invention. The system **100** includes a database **110** (or databases) that stores a plurality of profile and settings data from a user community. The profile data is generated from a plurality of client computers **120** that have generated profile settings in accordance with various applications. Such applications can include communications systems, general computing systems such as operating system settings, development system applications, and substantially any type of application whereby configuration settings are applied to customize the application according to users preferences. An analyzer **130** applies various statistical, mathematical, and/or models to the database **110** to determine one or more profiles **140** that can be displayed at a user interface **150**. Such profiles **140** are automatically selected by the analyzer **140** from a plurality of factors such as from demographic or survey information supplied by a user of a client computing system **160** that may employ one or more of the generated profiles **140** for configuration or operations. The user interface **150** also includes various user inputs or selections **170** to enable the user to guide selection of a desired profile via the analyzer **130**.

As noted above, the analyzer **130** can employ several techniques to process profile or settings data from the database **110**. In one aspect, this can include employment of collaborative filter techniques to analyze data and determine profiles **140** for the user. Collaborative filtering systems generally use a database about user preferences to predict additional topics or products a new user might like. In accordance with the present invention, collaborative filtering is applied by the analyzer **130** to process previous system settings preferences of users to predict likely or possible settings or profiles for new users of a system. Several algorithms including techniques based on correlation coefficients, vector-based similarity calculations, and statistical Bayesian methods can be employed.

One task in collaborative filtering is to predict the utility of items to a particular user (the active user) based on a database of user votes (express or implied) from a sample or population of other users (the user database **110**). Memory-based algorithms operate over the entire user database to make predictions. In Model-based collaborative filtering, in contrast, employs the user database to estimate or learn a model, which is then used for predictions. Beyond distinct memory-based and model-based methods, combination methods have been developed. For instance, a collaborative filtering method called personality diagnosis (PD) can be employed that can be seen as a hybrid between memory- and model-based approaches. All data is maintained throughout the process, new data can be added incrementally, and predictions have meaningful, probabilistic semantics. Each user's reported preferences are interpreted as a manifestation of their underlying "personality type." It is assumed that users report ratings for an item with Gaussian error. Given the active user's known ratings of items, the probability can be computed that he or she has the same personality type as every other user, and then compute the probability that he or she will desire some new item.

PD retains some of the advantages of both memory- and model-based algorithms, namely simplicity, extensibility, normative grounding, and explanatory power.

Collaborative filtering systems may be distinguished by whether they operate over implicit versus explicit votes. Explicit voting refers to a user consciously expressing his or her preference for a title, usually on a discrete numerical scale. Implicit voting refers to interpreting user behavior or selections to impute a vote or preference. Implicit votes can based on browsing data (for example in Web applications), purchase history (for example in online or traditional stores), or other types of information access patterns such as from the database of **110** that stores previously selected or currently used preference settings from the systems **120**.

Generally, the task in collaborative filtering is to predict the votes of a particular user (referred to as the active user) from a database of user votes from a sample or population of other users. In memory based collaborative filtering algorithms, the votes of the active user are predicted based on some partial information regarding the active user and a set of weights calculated from the user database. In the field of information retrieval, the similarity between two documents is often measured by treating
each document as a vector of word frequencies and computing the cosine of the angle formed by the two frequency vectors.

From a probabilistic perspective, the collaborative filtering task can be viewed as calculating the expected value of a vote, given what is known about the user. For the active user, it is desired to predict votes on as yet unobserved items. One plausible probabilistic model for collaborative filtering is a Bayesian classifier where the probability of votes are conditionally independent given membership in an unobserved class variable C taking on some relatively small number of discrete values. The concept is that there are certain groups or types of users capturing a common set of preferences and tastes. Given the class, the preferences regarding the various items (expressed as votes) are independent. The probability model relating joint probability of class and votes to a tractable set of conditional and marginal distributions is the standard "naive" Bayes formulation.

An alternative model formulation for probabilistic collaborative filtering is a Bayesian network with a node corresponding to each item in the domain. The states of each node correspond to the possible vote values for each item. A state corresponding to "no vote" for those domains is also included where there is no natural interpretation for missing data. An algorithm is then applied for learning Bayesian networks to the training data, where missing votes in the training data are indicated by the "no vote" value. The learning algorithm searches over various model structures in terms of dependencies for each item. In the resulting network, each item will have a set of parent items that are the best predictors of its votes. Each conditional probability table can be represented by a decision tree encoding the conditional probabilities for that node.

Before proceeding, it is noted that the user interface **150** can be provided as a Graphical User Interface (GUI). For example, the interface **1500** can include one or more display objects (e.g., icon) that can include such aspects as configurable icons, buttons, sliders, input boxes, selection options, menus, tabs and so forth having multiple configurable dimensions, shapes, colors, text, data and sounds to facilitate operations with the systems described herein. In addition, the user inputs **170** can also include a plurality of other inputs or controls for adjusting and configuring one or more aspects of the present invention. This can include receiving user commands from a mouse, keyboard, speech input, web site, browser, remote web service and/or other device such as a microphone, camera or video input to affect or modify operations of the various components described herein.

Referring now to FIGS. **2-3**, example collaborative filtering diagrams are presented in accordance with an aspect of the present invention. FIG. **2** is a diagram **200** that shows preference data spread evenly in a three-dimensional space. However, rather than being spread evenly in a multi-attribute space of preferences, users are often similar in different ways to other users.

In FIG. **3**, a diagram **300** illustrates a more representative form of data. In many cases, people have similar preferences to other people and people can be grouped into clusters based on similarity in a multidimensional space. The subject invention can employ machine learning and inference techniques or simpler statistical clustering methods, to reason about the likelihood that a user with some preferences or demographic information would agree with other previously unspecified settings or preferences.

This type of service or application is broadly referred to as "collaborative filtering." In one aspect, the present invention focuses on the application of collaborative filtering for the general case of identifying software settings, and more specifically for identifying preferences about context-sensitive computing, in particular for the definition of the cost of interruption in different settings, with an application in communications in one specific example. However, as noted above, the subject invention can be applied to substantially any type of electronic system that employs settings for configuration and operations. The following examples although framed in many cases in terms of a communications system should not be considered as limiting the present invention to communications systems. For example, some of the following systems describe a "Bestcom" communications system that employs selected preferences of contactors and contactees to deliver electronic communications via the "best" or most likely means for establishing communications between parties in view of the preferences.

Turning to FIG. **4**, a communications prototype interface **400** is illustrated in accordance with an aspect of the present invention. As noted above, Bestcom systems employ best means communication methods based upon preferences of contactees and contactors. A Bestcom prototype is depicted as the interface **400** and has been used to explore formal use of expected utility as well as control via the specification of high-level cost-benefit rules. Considering cost-benefit rules control, the communications system and interface **400** considers context, including time of day and day of week, as well as the call priority (which can be interpreted as the cost of deferring a call) of individuals and groups of people. This interface **400** shows a group manager, showing people, grouped by organization and activity, including such groups as meeting in one hour from now, people whom I called today, and so forth.

Proceeding to FIG. **5**, a diagram **500** depicts how prioritized calls or messages are routed to a receiver of the messages over time and in view of the cost of interruption of the prioritized messages. The high-level cost-benefit version of the communications system allows calls to be routed through to users, even when they are in a mobile setting, but considering the current, dynamically changing cost of interruption, based on meetings, sensed observations (such as a microphone and conversation analysis system picking up conversation), and desktop activities (e.g., what

is the user doing now), and settings, such as what is the user's Instant Messenger status set up to report (busy, away, etc.).

One concept with the metaphor depicted in the diagram **500** is that people break through to those that have a priority (low, medium, and high) that is as high or higher than the cost of interruption. According to this example of routing prioritized messages in accordance with preferences, collaborative filtering for software settings can be applied. It is to be appreciated that collaborative filtering techniques can apply to many scenarios and applications where people can configure software or other systems based on preferences. Thus, an architecture can be constructed that can take information about settings from multiple users and then analyze the settings to build systems that can assist single users with setting up their preferences. Demographic information can be used if it is available as another input along with other factors that are described below.

Referring briefly to FIG. **6**, an interface **600** is illustrated. In this case, a cost-benefit system can be set up by specifying caller priorities and also the cost of interruption in different settings. For the example interface **600**, users enter a preference specification view. Note, that the current context sensed by the system and the cost of interruption is indicated in the lower right-hand corner of the interface at **610**. Referring briefly to FIG. **7**, an interface **700** is depicted that enables users to specify activities and times when they are considered busy. In this example, users can specify when they are in a low, medium, or high cost of interruption state, by time and/or activities. Although the focus of the following description is on activities, the associated methods can apply broadly to any settings and/or systems.

FIG. **8** illustrates an interface **800** for defining varying context states and associated cost of interruptions for various user states. In this example, an activity selector **810** allows users to select and parameterize observations, from categories of activities, calendar, and sensors. Activities refer to desktop computing activities (application in focus and actively in use) or settings (e.g., Messenger). Calendar refers to properties about meetings in progress. Sensors refer to acoustical and visual sensing, and other multi-modal sensing.

With this particular sample interface **800** running as part of a client-side telephony application, that is in communication with a server, a user can select, parameterize, and drag items into high, medium, and low cost of interruption folders at **820**. A set of items indicates a boolean or'ing of the distinctions; when any of the distinctions is active in a category, the category becomes true. The system reports back the highest cost category that is activated by the status of the distinctions in the category. In building this system, an example architecture was created that stores the preference settings of users on a centralized server however, distributed or web-based servers can also be employed.

In this example, the subject invention employs preference encodings for the control of cost-benefit—centric communications system, to develop a preference recommendation system that considers the preferences and backgrounds of multiple users to create a profile assistant. Users can access the profile assistant by clicking on the Profile Assistant button **830**. The Profile Assistant button takes the users from a client-side preference assessment application to a web service that runs inference to perform collaborative filtering, as well as statistical summaries of user preferences in the community of users, to provide a preference-assessment assistant service. Profile assistant interfaces activated from the button **830** are described in more detail below with respect to FIGS. **10-20**.

FIG. **9** is a block diagram of a profile builder **900** in accordance with an aspect of the present invention. The profile builder **900** can receive data regarding a plurality of users, and stores respective community profiles for these users in a community store **910**. The profile builder **900** can leverage off of these completed and/or partially completed profiles in connection with building new profiles for users (new and/or existing). Data regarding a user that desires to build a new profile is employed in connection with the community profiles to facilitate the user building a personalized profile. Various statistical and/probabilistic schemes can be employed, for example, to identify to the user top n settings by particular parameter(s), top m settings by popularity, top x most similar profiles to facilitate the user selecting most appropriate sub-profiles as part of a personalized profile building effort.

The profile builder **900** can be employed with a profile editor provides for selecting from a plurality of states (e.g., activities, calendar . . .), and for using such selected states in connection with building a personal profile. Additionally, a profile assistant can provide recommendations based at least in part upon community profiles via any of a plurality of suitable metrics (e.g., recommendations, similarity between current user and a subset of users represented in the community profiles, popularity of particular settings (e.g., given context) . . . . As can be appreciated, the subject invention substantially facilitates personalized profile building by leveraging off of existing profiles. More particularly, the invention takes into consideration that a large percentage of individuals may have coincident preferences with respect to profile setting for particular states; and by identifying correlations among subsets of individuals recommendations as to profile settings can be provided to an individual to stream-line as well as enhance personalized profile building.

FIGS. **10-20** illustrate example profile interfaces in accordance with an aspect of the present invention. With reference to FIG. **10**, a view of the web service interface **1000** is illustrated. My Profile at **1010** is populated with the current settings that has been input to client software, as well as sample demographic information (in this case, organizational role). Available observations are listed by category on the left of My Profile at **1020**. Collaborative Filtering is employed to the right of the column at **1030**, and displays settings that one may like to include in the definition of low, medium, and high cost of interruption, based on the settings that have already been placed there by an example user. Any distinctions in the recommendations column of **1030** can be selected and moved into My Profile at **1010**. Beyond looking at inferences, users may desire to inspect settings by popularity. By selecting "By Popularity" at **1040** users can now see a listing by popularity, shown on FIG. **11**.

Referring to FIG. **11**, an interface **1100** depicts a view by popularity. Again, users can select and move observations from a Recommendations column **1110** into a My Profile column at **1120**. Another powerful feature of inference is illustrated, in this case, visiting other people by similarity. By selecting a "Show Profiles of People Like Me" button **1130**, users can view people who are most like them, both in terms of what they have said about how they define low, medium, and high cost of interruption, and, if available, their organizational role or job title. Such demographics could include other properties, like age, sex, years at a company, number of calls received per day, and so forth.

Referring to FIG. **12**, an interface **1200** illustrates turning on view profiles of similar people column at **1130** of FIG. **11**, actual anonymized profiles are displayed that are most similar to the current user's profile and demographics. In this case **88** profiles are above a similarity threshold for display. The user can peruse actual existing user-crafted profiles for multiple users. These are ordered from the most similar to less similar profiles in the community of users of this application. In this case, the user has selected profile number **7** out of 88 total available over threshold as interesting. The user can pick specific observations by selecting the observations or can click on the "Make this My Starting Point" button at **1210**. Making this selection **1210** loads in the entire profile and replaces the user's previous settings. With the new profile of FIG. **12** being selected at **1210**, the My Profile settings are updated as depicted in the interface **1300** of FIG. **13** at **1310**. Recommendations for extension of the definitions are updated via collaborative filtering inference at **1320**, and the list of similar profiles is also resorted and thresholded at **1330**. The user can continue to refine their own profile and save it out, if desired. When the user is finished, they can save the profile and the settings as they appear in his or her client software settings.

Referring to FIG. **14**, an interface **1400** is illustrated whereby a user is at a starting point having no prior preference assessments. The view **1400** depicts when a user starts with a clean slate, and indicates (selects or inputs option) that the user is a Program Manager at the organization at **1410**. Recommendations from the collaborative filtering system are displayed under recommendations at **1420**. Similar profiles are also indicated at **1430**.

FIGS. **15-20** illustrate various features of the subject invention. FIG. **15** illustrates changing a demographic from Program Manager to Developer/Architect at **1510** leads to other inferences and similar profiles. FIG. **16** illustrates how the user has selected one item, to add to define when he/she is in a state of high cost of interruption at **1610** (e.g., Using the development package, Visual Studios). Now recommendations and the similarities are updated to reflect this preference. At FIG. **17**, the user now goes to the recommendation list and selects, Using a Debugger at **1710**. This is added to the list and inference occurs, leading to changes in both the Recommendations and the similar profiles columns in FIG. **18**. At FIG. **19**, the user scans through some profiles along the dimension of most to least similar (over a threshold), and pauses to view one that seems to capture his/her preferences. The user selects, "Make this my starting point," at **1910** and loads in this profile to use as their own preferences. Now, inference of recommendations for extension occur again, and the recommendation list and most similar profile lists are updated as illustrated in FIG. **20**.

With reference to FIG. **21**, an exemplary environment **2110** for implementing various aspects of the invention includes a computer **2112**. The computer **2112** includes a processing unit **2114**, a system memory **2116**, and a system bus **2118**. The system bus **2118** couples system components including, but not limited to, the system memory **2116** to the processing unit **2114**. The processing unit **2114** can be any of various available processors. Dual microprocessors and other multiprocessor architectures also can be employed as the processing unit **2114**.

The system bus **2118** can be any of several types of bus structure(s) including the memory bus or memory controller, a peripheral bus or external bus, and/or a local bus using any variety of available bus architectures including, but not limited to, 11-bit bus, Industrial Standard Architecture (ISA), Micro-Channel Architecture (MSA), extended ISA (EISA), Intelligent Drive Electronics (IDE), VESA Local Bus (VLB), Peripheral Component Interconnect (PCI), Universal Serial Bus (USB), Advanced Graphics Port (AGP), Personal Computer Memory Card International Association bus (PCMCIA), and Small Computer Systems Interface (SCSI).

The system memory **2116** includes volatile memory **2120** and nonvolatile memory **2122**. The basic input/output system (BIOS), containing the basic routines to transfer information between elements within the computer **2112**, such as during start-up, is stored in nonvolatile memory **2122**. By way of illustration, and not limitation, nonvolatile memory **2122** can include read only memory (ROM), programmable ROM (PROM), electrically programmable ROM (EPROM), electrically erasable ROM (EEPROM), or flash memory. Volatile memory **2120** includes random access memory (RAM), which acts as external cache memory. By way of illustration and not limitation, RAM is available in many forms such as synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), enhanced SDRAM (ESDRAM), Synchlink DRAM (SLDRAM), and direct Rambus RAM (DRRAM).

Computer **2112** also includes removable/non-removable, volatile/non-volatile computer storage media. FIG. **21** illustrates, for example a disk storage **2124**. Disk storage **2124** includes, but is not limited to, devices like a magnetic disk drive, floppy disk drive, tape drive, Jaz drive, Zip drive, LS-100 drive, flash memory card, or memory stick. In addition, disk storage **2124** can include storage media separately or in combination with other storage media including, but not limited to, an optical disk drive such as a compact disk ROM device (CD-ROM), CD recordable drive (CD-R Drive), CD rewritable drive (CD-RW Drive) or a digital versatile disk ROM drive (DVD-ROM). To facilitate connection of the disk storage devices **2124** to the system bus **2118**, a removable or non-removable interface is typically used such as interface **2126**.

It is to be appreciated that FIG. **21** describes software that acts as an intermediary between users and the basic computer resources described in suitable operating environment **2110**. Such software includes an operating system **2128**. Operating system **2128**, which can be stored on disk storage **2124**, acts to control and allocate resources of the computer system **2112**. System applications **2130** take advantage of the management of resources by operating system **2128** through program modules **2132** and program data **2134** stored either in system memory **2116** or on disk storage **2124**. It is to be appreciated that the present invention can be implemented with various operating systems or combinations of operating systems.

A user enters commands or information into the computer **2112** through input device(s) **2136**. Input devices **2136** include, but are not limited to, a pointing device such as a mouse, trackball, stylus, touch pad, keyboard, microphone, joystick, game pad, satellite dish, scanner, TV tuner card, digital camera, digital video camera, web camera, and the like. These and other input devices connect to the processing unit **2114** through the system bus **2118** via interface port(s) **2138**. Interface port(s) **2138** include, for example, a serial port, a parallel port, a game port, and a universal serial bus (USB). Output device(s) **2140** use some of the same type of ports as input device(s) **2136**. Thus, for example, a USB port may be used to provide input to computer **2112**, and to output information from computer **2112** to an output device **2140**. Output adapter **2142** is provided to illustrate that there are some output devices **2140** like monitors, speakers, and

printers, among other output devices **2140**, that require special adapters. The output adapters **2142** include, by way of illustration and not limitation, video and sound cards that provide a means of connection between the output device **2140** and the system bus **2118**. It should be noted that other devices and/or systems of devices provide both input and output capabilities such as remote computer(s) **2144**.

Computer **2112** can operate in a networked environment using logical connections to one or more remote computers, such as remote computer(s) **2144**. The remote computer(s) **2144** can be a personal computer, a server, a router, a network PC, a workstation, a microprocessor based appliance, a peer device or other common network node and the like, and typically includes many or all of the elements described relative to computer **2112**. For purposes of brevity, only a memory storage device **2146** is illustrated with remote computer(s) **2144**. Remote computer(s) **2144** is logically connected to computer **2112** through a network interface **2148** and then physically connected via communication connection **2150**. Network interface **2148** encompasses communication networks such as local-area networks (LAN) and wide-area networks (WAN). LAN technologies include Fiber Distributed Data Interface (FDDI), Copper Distributed Data Interface (CDDI), Ethernet/IEEE 802.3, Token Ring/IEEE 802.5 and the like. WAN technologies include, but are not limited to, point-to-point links, circuit switching networks like Integrated Services Digital Networks (ISDN) and variations thereon, packet switching networks, and Digital Subscriber Lines (DSL).

Communication connection(s) **2150** refers to the hardware/software employed to connect the network interface **2148** to the bus **2118**. While communication connection **2150** is shown for illustrative clarity inside computer **2112**, it can also be external to computer **2112**. The hardware/software necessary for connection to the network interface **2148** includes, for exemplary purposes only, internal and external technologies such as, modems including regular telephone grade modems, cable modems and DSL modems, ISDN adapters, and Ethernet cards.

FIG. **22** is a schematic block diagram of a sample-computing environment **2200** with which the present invention can interact. The system **2200** includes one or more client(s) **2210**. The client(s) **2210** can be hardware and/or software (e.g., threads, processes, computing devices). The system **2200** also includes one or more server(s) **2230**. The server(s) **2230** can also be hardware and/or software (e.g., threads, processes, computing devices). The servers **2230** can house threads to perform transformations by employing the present invention, for example. One possible communication between a client **2210** and a server **2230** may be in the form of a data packet adapted to be transmitted between two or more computer processes. The system **2200** includes a communication framework **2250** that can be employed to facilitate communications between the client(s) **2210** and the server(s) **2230**. The client(s) **2210** are operably connected to one or more client data store(s) **2260** that can be employed to store information local to the client(s) **2210**. Similarly, the server(s) **2230** are operably connected to one or more server data store(s) **2240** that can be employed to store information local to the servers **2230**.

What has been described above includes examples of the present invention. It is of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the present invention, but one of ordinary skill in the art may recognize that many further combinations and permutations of the present invention are possible. Accordingly, the present invention is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the term "includes" is used in either the detailed description or the claims, such term is intended to be inclusive in a manner similar to the term "comprising", as comprising is interpreted as a transitional word in a claim.

What is claimed is:

1. A method comprising:

operating a computing device by:

displaying on a display of the computing device a graphical user interface, the graphical user interface comprising:

a first display object configured to display available states that are capable of being categorized among categories by a user to provide a state categorization, each of the categories corresponding to a respective cost of interruption for the available states that are included in the respective category,

a second display object configured to display potential profiles, including respective subsets of the available states categorized among the categories based at least in part on preferences from users other than the user in a community of users, based at least in part on an extent to which categorization of the subsets among the categories in the potential profiles is similar to categorization of one or more of the available states among the categories in the state categorization, and

at least one input object configured to receive user input specifying categorization of at least one of the available states among at least one of the categories;

selecting a specified category, which is chosen by the user, from the categories to be associated with a specified available state, which is chosen by the user, based at least in part on the specified category being chosen by the user;

adding the specified available state to the specified category, based at least in part on the specified available state being chosen by the user, in response to selecting the specified category from the categories to be associated with the specified available state;

filtering a set of profiles derived from the community of users based at least in part on the user input to automatically modify the potential profiles displayed in the second display object; and

configuring an application based at least in part on a selected profile of the filtered set of profiles.

2. The method of claim **1**, wherein the second display object comprises a recommendations display of potential profiles determined via a collaborative filter.

3. The method of claim **1**, wherein the graphical user interface further comprises a plurality of modes of selecting potential profiles, the plurality of modes comprising similarity and popularity.

4. The method of claim **1**, wherein the graphical user interface further comprises drag and drop capabilities for moving potential settings into a user profile setting.

5. The method of claim **3**, wherein filtering the set of profiles comprises:

employing demographic information to determine similarity of the profile of the user to each profile in the set of profiles.

6. The method of claim 1, wherein the graphical user interface further comprises a starting point input to select a recommended profile.

7. The method of claim 6, wherein the graphical user interface further comprises a component to update collaborative filtering profiles upon selection of a new profile.

8. The method of claim 1, wherein filtering the set of profiles comprises:

filtering the set of profiles based at least in part on a status of the user.

9. A method comprising:

operating a computing system to provide a graphical user interface to facilitate determination of user preferences for operation of an application by:

rendering on a display of the computing system a user interface for specifying a profile for configuring the application, the graphical user interface comprising at least a first display area, a second display area and a third display area, the first display area configured to display available states that are capable of being categorized among categories by the user to provide a state categorization of the profile, each of the categories corresponding to a respective cost of interruption for the available states that are included in the respective category, the second display area configured to display the state categorization of the profile, the third display area configured to display profiles of one or more other users that include respective subsets of the available states categorized among the categories;

receiving at least one user input specifying a first categorization of a first available state of the available states that is chosen by the user in a first category of the categories that is chosen by the user;

selecting the first category from the categories to be associated with the first available state based at least in part on the first category being chosen by the user;

adding the first available state to the first category, based at least in part on the first available state being chosen by the user, in response to selecting the first category from the categories to be associated with the first available state;

displaying an indication of the first available state in the first category in the state categorization of the profile in the second display area based at least in part on the first categorization;

automatically determining a plurality of potential profiles, including respective subsets of the available states categorized among the categories based at least in part on preferences from users other than the user in a community of users of the application, based at least in part on an extent to which categorization of the subsets among the categories in the potential profiles is similar to categorization of one or more of the available states among the categories in the state categorization;

rendering the plurality of potential profiles accessible to the user through the third display area of the user interface;

receiving input from the user through the third display area of the user interface, the input selecting a potential profile; and

configuring the application for the user based at least in part on the selected potential profile.

10. The method of claim 9, wherein configuring the application for the user comprises:

receiving user input modifying the selected potential profile; and

configuring the application with the modified selected potential profile.

11. The method of claim 10, wherein:

the method further comprises displaying the selected potential profile as a plurality of objects in the second display area; and

receiving user input modifying the selected profile comprises receiving user input dragging objects from the first display area to the second display area.

12. The method of claim 9, wherein rendering the plurality of potential profiles comprises:

displaying the potential profiles on the user interface, the potential profiles displayed on the user interface changing in response to user input.

13. The method of claim 9, wherein:

the potential profiles are ordered based at least in part on similarity to demographic characteristics of the user; and

rendering the plurality of potential profiles comprises rendering the potential profiles based at least in part on the order.

14. The method of claim 9, wherein:

the potential profiles are ordered based at least in part on similarity to selections made by the user; and

rendering the plurality of potential profiles comprises rendering the potential profiles based at least in part on the order.

15. At least one computer readable memory comprising computer-executable instructions that, when executed by a processor, perform a method comprising:

configuring an application for a user by:

rendering on a display of the computing system a user interface for specifying a profile for configuring the application, the graphical user interface comprising at least a first display area, a second display area and a third display area, the first display area configured to display available states that are capable of being categorized among categories by the user to provide a state categorization of the profile, each of the categories corresponding to a respective cost of interruption for the available states that are included in the respective category, the second display area configured to display the state categorization of the profile, the third display area configured to display profiles of one or more other users that include respective subsets of the available states categorized among the categories;

receiving at least one user input specifying a first categorization of a first available state of the available states that is chosen by the user in a first category of the categories that is chosen by the user;

selecting the first category from the categories to be associated with the first available state based at least in part on the first category being chosen by the user;

adding the first available state to the first category, based at least in part on the first available state being chosen by the user, in response to selecting the first category from the categories to be associated with the first available state;

displaying an indication of the first available state in the first category in the state categorization of the profile in the second display area based at least in part on the first categorization;

automatically determining a plurality of potential profiles, including respective subsets of the available states categorized among the categories based at least in part on preferences from users other than the user in a community of users of the application, based at least in part on an extent to which catego-

rization of the subsets among the categories in the potential profiles is similar to categorization of one or more of the available states among the categories in the state categorization;

rendering the plurality of potential profiles accessible to the user through the third display area of the user interface;

receiving input from the user through the third display area of the user interface, the input selecting a potential profile; and

configuring the application for the user based at least in part on the selected potential profile.

16. The at least one computer readable memory of claim **15**, wherein automatically determining a plurality of potential profiles comprises selecting settings that are most popular within the preferences from the community of users of the application.

17. The at least one computer readable memory of claim **15**, wherein automatically determining a plurality of potential profiles comprises selecting settings from a profile of at least one user within the community of users of the application, the at least one user within the community being selected based at least in part on demographic similarity to the user.

18. The at least one computer readable memory of claim **15**, wherein:

automatically determining a plurality of potential profiles comprises receiving user input indicating whether settings in the potential profiles are to be selected by popularity or similarity of users within the community to the user.

19. The at least one computer readable memory of claim **15**, wherein:

rendering the plurality of potential profiles comprises displaying settings of the plurality of potential profiles as a plurality of objects; and

configuring the application for the user comprises configuring the application for the user further by receiving user input altering settings of the potential profiles, including receiving user input dragging and dropping selective ones of the objects into the second display area.

20. The at least one computer readable memory of claim **15**, wherein the second display object is configured to enable the user to peruse the potential profiles.

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